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A
DISCOURSE
ON
SOME OF THE PRINCIPAL DESIDERATA
IN
NATURAL HISTORY,
AND ON
THE BEST MEANS OF PROMOTING THE STUDY
OF THIS
SCIENCE,
IN THE UNITED-STATES.

READ BEFORE THE PHILADELPHIA LINNEAN SOCIETY,
ON THE TENTH OF JUNE, 1807.

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PHILADELPHIA:
PRINTED BY DENHAM & TOWN,
No. 278, South Second-street.

1807.

PREFACE.

THE following Discourse was originally drawn up, without the most distant view to publication. It was, indeed, my wish to have confined the reading of it to the Members of the PHILADELPHIA LINNEAN SOCIETY: but I was urged to pronounce it in a more public manner, before a large and mixed audience, among whom were many of the most learned and respectable literary characters in Pennsylvania. The discourse, with all its imperfections, is now printed and published, at the request of the Society which gave birth to it.

IT is not a matter of any consequence to observe, but still I think it proper to mention the circumstance, that the Discourse, as it now appears, is, in several respects, different from what it was when I read it. Some few passages I have omitted in the publication: a greater number have been added;

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and a large part of the whole has undergone *some* variation, either in the style, or arrangement. These, I think, are liberties which an author is, at all times, entitled to take with his own productions.—It is hardly necessary to add, that the APPENDIX matter was not read before the Society. Some of the facts contained in this supplement will, I flatter myself, amuse the reader. It is possible, that they may even afford hints for dissertations, or memoirs, relative to some of the most interesting subjects of American Natural History.

I AM not certain that the public is essentially benefitted by the publication of such imperfect essays as that which is now laid before them. But there is a class of society to whom this essay may be useful. I mean the American students in Natural History, who wish some guide, or index, to point out some of the DESIDERATA of the science of nature. Imperfect and unfinished as is this essay, something upon the same plan would have been useful to me, when, twenty-three years ago, I made an effort to study ZOOLOGY and BOTANY, in Philadelphia, where I sought, in vain, for any one to put me into that path of study and research, which I have since followed up, if not with advantage to the public at large, yet with happiness to myself, and with some advantage to my Pu-

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pils. If the hints which I have thrown out, in this Discourse, should be of any use to only one half of my many pupils, now, so happily for science, settled in different parts of the United-States, I shall feel quite satisfied. When they read it, I wish them to remember, that, in one respect, their opportunities and advantages have been greater than my own: for I have never attended any lectures, however imperfect, on Natural History, or Botany.

Philadelphia, August 12th, 1807.

AN ORATION, &c.

THE PHILADELPHIA LINNEAN SOCIETY was established for the promotion of Natural History. Its original founders (the greater number of whom were young men), ardently attached to the study of nature, perceived the want of an institution which should be exclusively devoted to the cultivation of the different branches of natural history: an institution similar to those which have been founded, and have flourished, in most of the countries of Europe, where the names, the nature, and the properties of natural objects have been studied with any degree of attention, or success.

ALREADY, if I do not greatly mistake, have the benefits of our infant institution begun to be displayed. It has given, as it were, a new and very impressive direction to the minds of a number of young men, from whose talents, and industry, and zeal, in union with better opportunities than have yet been afforded to them, much important information may be expected.

AT a meeting of the Society, in the month of March last, it was resolved, that a member be appointed “to deliver an Oration, in which are to be particularly pointed out the Desiderata in Natural History, and the best means to be pursued for the Advancement of the Science.”

WITH this appointment I have been honoured by my colleagues. The task which they have entrusted to me, is one of some difficulty, and far too extensive to be discussed on this occasion. It would require a volume to do justice to the subject. I feel, most unaffectedly, the propriety of claiming the indulgence of the Society,—and of this learned and polite audience,—while I read to them these miscellaneous fragments, which my numerous avocations have prevented me from digesting into better and more seemly order. An entire *disposition* to fulfill the wishes of the Society will not, I flatter myself, be called in question.

NATURAL HISTORY, Gentlemen, is the object of our institution. This is a field so extensive, and with respect to this country, so interesting and so new, that none of us, whether our object be the usefulness which attends, or the fame which follows, science need extend our inquiries far beyond its limits. What those limits are, it may seem proper to attempt to specify on this occasion.

VARIOUS have been the opinions of authors concerning the precise objects, or the actual limits, of the science of nature. Among the ancients, especially among the Romans, Natural History was employed as a term

of most extensive import. It comprehended whatever of physical knowledge was then known; whether it respected this globe, or the other worlds which compose the universe. Geography was considered as a branch or department of Natural History, and accordingly we still consult the work of Pliny for some of the most precious information that has descended to us, from those times, concerning the geography of the earth. Astronomy, also, was deemed a branch of Natural History. Even the science of Medicine, including the names and nature of diseases; the names, the arrangement, and the nature of medicines; the means of preventing, or of curing diseases, was considered by the Romans as a branch of the great stock, or stem, upon which they bestowed the appellation of *NATURALIS HISTORIA**.

FROM this imperfect view of the subject, it is evident, that among the Romans (so far, at least, as we are permitted to form a judgement from the books of Pliny) Natural History embraced almost every department of the science,—and even the arts,—of the times; mere moral or political science excepted.

IN modern times, the term Natural History is employed in a much more restricted sense. Some writers, indeed, among others the late learned Lord Kaimes, seem to consider it as a mere science (or rather a collection) of such physical *facts* as respect what we usually denominate the *THREE KINGDOMS OF NATURE*: that is the series of Animals, of Vegetables and of Min-

* See Cæli Plinii Secundi Naturalis Historiæ Libri xxxvii.

erals; reserving to other and higher sciences, the explanation of those facts, and whatever of theory, or of speculation, might be adduced concerning them.

BUT Natural History is by no means thus limited in its views. It is, indeed, or it ought to be, *necessarily* a Science of Facts. But no science more than this calls for systems or arrangements of facts, and for reasonings concerning them. One of the higher charms of Natural History is, that it so easily admits, in many instances at least, of just and happy arrangements; and of beautiful and correct theories: of theories, too, which are permanent, and not those false, those evanescent, creations of a day, by which Medicine (not to mention other sciences) has sometimes been injured, and often sullied, disfigured, or disgraced.

I do not intend to attempt a precise or regular definition of Natural History. I will only observe, that the least objectionable definition of the science, that I have met with, is that which designates it to be "the Physical History of Nature on this Globe." But, certainly, this definition is infinitely too extensive, since Natural History, thus characterized, would comprehend the *whole* of the great sciences of Anatomy, and Physiology, Chemistry, and Materia Medica; the history of Light and Colours, and even, in some measure, the history of the Tides; not to mention many other sciences, or branches of science, which no one, in our times, considers as appertaining *exclusively* to Natural History.

It is, in truth, extremely difficult to point out the precise limits of Natural History, so intimately connected is this science with many others, particularly perhaps with Anatomy, Physiology, the Materia Medica, and Chemistry. Unquestionably, a large portion of what relates to the fabric and functions of animals; of what relates to the general analysis of natural objects, whether they be derived from the animal, the vegetable, or the mineral kingdoms, or elsewhere; as well as what relates to the uses of those objects in medicine, or the arts, and many other questions of a like nature, are all, in strict propriety, subjects of Natural History.

NATURAL HISTORY has been divided into the following six great branches, each of which may be said to constitute a distinct science of itself: I. ZOOLOGY. II. BOTANY. III. GEOLOGY. IV. MINERALOGY. V. HYDROGRAPHY: and, VI. METEOROLOGY.

I. ZOOLOGY is the history of the Animal kingdom. This is, unquestionably, the most important branch of Natural History. It involves a most numerous set of living beings, whose structure and functions, whose instincts or manners, whose uses, are eminently entitled to the attention of philosophers.

II. THE science of BOTANY, called likewise Phyto-logy, is the history of the Vegetable kingdom. It is principally restricted to the nomenclature and the classification of vegetables, their anatomy, and physiology.

III. GEOLOGY is the history of our Mineral globe. It, in an especial manner, regards the fabric of the

globe, the nature of the materials of which it is composed; the arrangement of those materials, and many other questions of a like kind.

IV. MINERALOGY is, in strict propriety, a branch or division of Geology. It is more concerned with particulars than is Geology. It regards the names, the analysis, and the classification of the individual Minerals of the globe.

V. HYDROGRAPHY, which Linnæus considered as a part of mineralogy, is that branch of natural history, which relates to the Waters of our globe.

VI. THE sixth and last branch of the science is METEOROLOGY. This may be defined the history of our Atmosphere, and of its various phenomena. It has been justly observed of this science, that it forms the connecting link, as it were, between Natural History, properly so called, and Physics. It is certain, that many important circumstances relative to the atmosphere do not so properly fall under the notice of the naturalist, as under that of the natural philosopher, or the chemist.

Whatever strictly appertains to any of these sciences, comes within the scope of our views. It can hardly be necessary to add, that some of these branches of Natural History are more entitled to our attention than others. Such are Zoology, Botany, and Geology, or Mineralogy. Of these the two first seem to me to have a more immediate relation, than the others, to the important science of medicine, to which most of you have attached yourselves. Thus the great and beautiful science of

Physiology borrows many of its most essential aids from the natural history of animals. Indeed, without the assistance of Zoology, Physiology is a very feeble, limited, and imperfect science. If Haller had not been a profound naturalist, his *Elementa*, which is infinitely the greatest medical work the world has, hitherto, seen, would not now claim, as I have no doubt it will claim, five hundred or a thousand years hence, when medicine and all its branches shall have undergone great, perhaps *total* revolutions; if Haller, I say, had not been a great naturalist, his *Elements* would not now claim the notice and the admiration of every philosophical physician. Nay, such is the intimate connection which subsists between the different sciences, that the human physiology is, and ever will be, imperfect, until we shall, by numerous experiments, have enlarged our knowledge of the physiology of plants.

I SHALL now, agreeably to your request, endeavour to point out some of the principal Desiderata of the science of Natural History, and the most effectual means to be pursued for the Advancement of the Science. And here I shall especially confine myself to those subjects in the investigation of which we, as Americans, are especially interested.

I BEGIN with ZOOLOGY.

OUR first object, in this branch of the science, should be to render more perfect the catalogue of our indigenous animals. Many of these are, unquestionably, unknown to us. This is especially the case with respect to the Fishes, the Amphibious animals, the Insects, and

the Vermes. But even in the class of Mammalia, not a few, and of the Birds a considerable number of, species are undescribed. I believe one tenth part of all the North-American quadrupeds is in this situation. I shall not be found too rash in hazarding an assertion, that, at least, one sixth of our birds is unknown to naturalists. With respect to the other classes, which I have mentioned, the field for discovery and observation is incalculably large.

BUT Natural History is not merely a science of Names and Arrangements. Higher objects should claim the attention of the philosophical naturalist. Some of these I shall now proceed to mention.

WHATEVER relates to the physical history of the Human Kind is a primary object with the philosophical naturalist. The natural history of our Indians is a subject of much curiosity and importance, but has been greatly neglected. It is true, many of the European writers who have visited this continent, have given us some valuable information on the subject. But they have left much more to be done.—I say nothing of the labours and researches of our own countrymen.—We should lose no time in completing the history of these people, before they shall be swept from the surface of the earth, by the contagion of our vices: shall I add, by the injustice of our measures?

THE origin, or native country, of the Indian races of America, is one of those questions which have solicited the attention of philosophers and historians, ever since the first discovery of this portion of the world.

The generality of writers have supposed, that America was peopled from Asia. Some writers, however, who have examined this subject (or rather looked upon it), in a very superficial manner, are of opinion, that Asia received its inhabitants from America: while others, whose claims to the character of patient and correct inquirers are equally inconsiderable, have imagined, that the Americans are really the Aborigines, or *Autochthones*, of the soil and regions in which they were discovered.

THE latter opinion has been warmly espoused by Bernard Romans, whose name (although less known, and infinitely less splendid, than those of several other writers, on the same side of the question) I here particularly mention, because this rapid writer supposes it more probable, that Asia received some of its hordes from America, than that the latter continent was peopled from the former*.

THE theory of Romans seems, in part, to have been adopted by a distinguished American character, who supposes, that the Red-Men of America are *older* than those of Asia†. But the arguments by which this gentleman has endeavoured to establish his hypothesis, do not appear to me to have much weight. I will even venture to say, that they are feeble and illusory. Indeed, I cannot help observing, in thus openly addressing myself, in an especial manner, to a number of young men, and young naturalists, who may be misled by the authority and opinion of men of high reputation, and

* See Note A.

† See Note B.

high in the confidence of their country, that the notion of the derivation of the Asiatics from America, is a doctrine opposed to the authority of the most ancient writings that have descended to us ; opposed to the history and traditions of the Asiatics, in more recent times; opposed to the pictures and traditions of the Americans, and to the actual state of society and of population, in the greater part of America.

WHATEVER may serve to throw any additional light upon this question,—to which, as one of the grandest and most important questions in natural history, I could not refrain from alluding,—is worthy of the attention of the Linnean Society, and of every lover of truth, of genuine science, and religion, wherever he may be placed. Nor is the satisfactory decision of the question relative to the original of the Americans, beyond the reach of science. It is, indeed, a question which can only be fully decided by much labour and patience in research; aided by that candour, which should be inseparable from the character of a genuine philosopher.

FOR the investigation of this subject, we should lose no time in collecting vocabularies of the languages of the Indians ; as well those with whom we have long been acquainted, as those who have recently become known to us through the medium of the travels of Mr. Mackenzie, Captains Lewis, Clark, Freeman, and others. In this inquiry, too, it will be highly important to have an eye to the religious institutions and the mythology of the Americans. I have elsewhere shown, that large fragments of the Asiatic mythology

are preserved, in a considerable degree of purity, in the most distant or opposite regions of America:* on the shores of Lake-Superior and Ontario, and on the confines of the Plata and Maragnon.

THE Indian is, unquestionably, of Asiatic origin. But some of the American quadrupeds and other mammalia are peculiar to this portion of the earth. Actual weights of these animals, both those of the former and of the latter class; observations respecting their food, the extent of country which they occupy, their migrations, and the causes of those migrations; whatever relates to their instinctive manners, their useful or injurious effects in the economy of nature, their torpid condition, their anatomical fabrick, are all questions worthy of our attention.—A complete natural history of the Beaver, or the Opossum, would be a real treasure to the philosophical world.

WE are already in possession of a sufficient number of facts to establish this point, that the continent of North-America was formerly inhabited by several species of animals, which are now entirely unknown to us, except by their bones, and which, there is every reason to believe, now no longer exist. The bones of the Mammoth, or American Elephant, those of the Megatherium, not to mention some others, have been discovered; the former in many parts of North-America. Whatever may tend to render more perfect our acquaintance with these animals will form one of the most

* See *New Views of the Origin of the Tribes and Nations of America* Preliminary Discourse. Philadelphia: 1798.

interesting points in Natural History, and ought I think, to engage the attention of the Society. For what can be more interesting than histories of the species which formerly inhabited this Globe, and have now entirely disappeared?

I SPEAK of these animals as *extinct*. In doing this, I adopt the language of the first naturalists of the age. No naturalist, no philosopher; no one tolerably acquainted with the history of nature's works and operations, will subscribe to the puerile opinion, that Nature does not permit any of her species of animals, or of vegetables, to perish. There is, without doubt, a harmony in the works of Nature:—a harmony beautiful and divine! There is a passage, by gradual and intermixing characters, from species to species, and from genus to genus: BUT THERE IS NO SUCH THING AS A CHAIN OF NATURE: an absolutely necessary dependance (on this earth) of one species upon another. Plato's chain of nature is a dream. The metaphysical views which that sublime genius has given us of the intertexture of species, have spoiled by their influence, in succession, the philosophy of Greece, of Rome, and of America. So powerful is the influence of authority! So propense are men to embrace systems, without an examination of the solidity of their foundations.

IN the science of ORNITHOLOGY, there is likewise, much to engage the attention of the naturalist, whether as a mere nomenclator, or as a cultivator of the science in a philosophical point of view. North-America is immensely rich in the species of Birds, and I have already hinted at the great number of species that remain undescribed.

UNDER this article of our ornithology, I beg leave to mention the following heads of subjects, as a few of those which should claim the notice of the naturalist. Whatever relates to the migration of our birds, and the causes of their migration: an accurate list of the generally resident, and generally migratory birds of particular States of the Union, or particular districts of those States: the times of the disappearance and return of the real migratory species: the state of vegetation at the time; what useful indications any of our birds may afford to the farmer respecting the cultivation of the earth, or the management of vegetables: a subject to which, it is well known, the ancients paid much attention. What is the theory of the fact, that the southern migratory birds of our country ascend to much higher latitudes on the western, than on the eastern, side of the great Alleghany-chain of mountains? I have, in another place, attempted to explain the fact, but every one may not be satisfied with my theory.* What is the real truth in regard to the long-contested question, respecting the different species of Swallows? Some of the species do, unquestionably, hibernate among us, if not always, at least *very often*. Of other species it is equally certain, that they sometimes, if not always, migrate. Does not our Sand-Swallow (*Hirundo riparia*) *generally* pass the winter with us? How far are we to place dependance upon the accounts which we sometimes receive of the torpid state of Parakeets (*Psittacus Carolinensis*), of Goat-suckers (*Caprimulgus Virginianus*), not to mention many other birds, which are generally deemed mi-

* See Fragments of the Natural History of Pennsylvania. Part First. Introduction. Pages 6 & 7. Philadelphia: 1799.

gratory? Which of our birds are the most injurious to the labours of man? and which species are especially worthy of being preserved? In the state of Georgia, our countrymen have already enacted laws for the protection of one species (the Vultur Aura), which we call Turkey-Buzzard: but several other species, if I do not greatly mistake, are equally entitled to the protection of the laws, and have claims for their preservation, upon the *good sense* of the public.* Are not several of our native species of birds worthy of being domesticated? Our Wild-Goose (*Anas Canadensis*) is easily brought into this state, and readily intermixes with the common tame Goose.—Would it not be possible to domesticate our Pheasant, the Grouse, and the Partridge, or Quail?† Two of these noble species of birds are rapidly disappearing in some parts of the Union.—The Indians of Carolina domesticated a large bird of the natural family of the *Grallae*, or Waders. What bird was this?—Some of our grallae are good eating, and might, with great facility, be brought into the domesticated state. A very interesting paper might be written on the North-American birds that are worthy of domestication. In hopes that some active member of the Society will endeavour to collect materials for such a paper, I have ventured, in this place, to throw out the few crude hints which I have given you.

* See Fragments of the Natural History of Pennsylvania. Part First Appendix. p. 21—24.

† The Pheasant is the *Tetrao Cupido*, the Grouse the *Tetrao umbellus*, and the Partridge the *Tetrao Marilandicus*, of Linnæus. The last of these birds is called Partridge in Pennsylvania, and Quail in New-York, and other of the States.—See Note C.

THE naturalists of the United-States enjoy uncommon advantages of cultivating the natural history of the animals of Linnæus's third class of animated nature: I mean the AMPHIBIA, comprehending the Oviparous Quadrupeds, the Serpents, and several anomalous genera, which do not fall under either of the appellations just mentioned. Our country abounds in animals of these great families. Many of the species are undescribed, and the structure, the functions, and the manners, of most of them are, in a great measure, unknown to the writers of books on the science.

It is true, indeed, that, within the last ten years, our knowledge of the North-American amphibia has been considerably enlarged. We have discovered several new species of Serpents, belonging to the genera *Crotalus*, *Côluber*, and others; some new species of *Salamandra*, and new species of *Siren*, or *Proteus*. The largest *Salamandra*, yet known, is a very common inhabitant of the American lakes, Erie, Ontario, &c., and also of the Ohio, and other waters of the Mississippi. It is less common in the western streams of the Susquehanna. I call this species *Salamandra horrida**. My pupil Dr. Peter Custis, of Virginia, has observed near the Red-River, a new and singular species of *Proteus*, which resembles the *Proteus anguinus*, and some other European species, in being furnished with *four* legs. I have myself paid great attention to one of the *biped* species of this genus, perhaps that which Linnæus denominated *Siren lacertina*, and have I flatter myself, nearly com-

* See Second Supplement to the Philadelphia Medical and Physical Journal. Pages 196 & 197.

pleted its history. But the history of the other American *Protei* is very imperfectly known to us.—Is the animal described by M. De Beauvois* a species of this genus, or only the *cordylus* or some *lacerta*?—The natural history of our Alligator is worthy of particular attention. If I do not greatly mistake, *two* distinct species of the genus inhabit the shores and rivers of the United-States, to the south of Virginia. Yet it is commonly supposed, that we have only *one* species, within the limits of the Union.—Might not the musk of our common Alligator be collected in sufficient quantity to answer some of the demands of commerce, both as a medicine and as a perfume. In North-Carolina, this odoriferous substance is sometimes collected, and is used with the latter intention. As a medicine, it would, in all probability, be found much more powerful than the generality of the musk of the *shops*.—Having thus mentioned the Alligator, I take the opportunity of observing, that a species of this vast amphibious animal was once (probably at a very remote period) an inhabitant of different parts of the United-States, considerably further to the north than the present most northern habitation of any of the species, that are known to us. The remains of a Crocodile have been found in the State of New-Jersey, nearly in the latitude of $40^{\circ} 20'$, and at the distance of about forty miles from the (present) nearest margin of the Atlantic.

A COMPLETE history of the different American species of *Crotalus*, or Rattle-snake, is a great desiderat-

* See Transactions of the American Philosophical Society. Vol. iv art. xxxiii. page 277, &c.

um in natural history. Under this head, the following points, among many others, are particularly worthy of attention: viz. the precise period of the generation of this reptile, and the number of its young. Is the *crotalus* viviparous in *every* part, or only in the *warmer* parts, of America? Do the young *crotali*, when alarmed, or in danger, take shelter in the stomach (or oesophagus) of both their parents, or the mother only?—The uses of the *crepitaculum*, or rattle. Is this appendage of any use in procuring the animal its food? * The chemical and physiological nature of the poison of the *crotalus*. How far are its powers enhanced or diminished by the temperature of the climate, in which the animal resides? Is there any difference in the degree of activity of the venom of the different *sexes*? Is it a fact, that the venom is peculiarly deleterious during the season of the generation of these reptiles? I believe it is.—At what age is an active venom first secreted in the young *crotalus*?—What animals does the poison affect, and which are proof against its action?—It is not true, that the venom exerts no effects upon the hog-kind.—What is the most plausible theory of the innoxious nature of this poison, when it is applied to the bodies of the greater number of the *animalia frigida*, or cold-blooded animals? Is the venom capable of affecting the animal itself? Can one rattle-snake destroy, with its poison, another individual of the same species? What is the mode of action of the poison upon man, and other animals? Does it act by being absorbed into the course of

* See Supplement to a Memoir concerning the Fascinating faculty which has been ascribed to the Rattle-snake, and other American Serpents. p. 7, 8, 38, &c. Philadelphia: 1800.

the circulation? Or does it act through the medium of the nerves, or the muscular system? What foundation is there for the theory of the Abbé Fontana, who supposes, that the poison of the Viper exerts its principal effects upon the blood? What are the best means of curing the violent symptoms induced by the poison of the crotalus? Have we yet discovered any certain specific for the bite of this reptile? Does not nature, that is the powers of the constitution, generally effect the cures, which we fondly ascribe to the agency of medicines? What is the ordinary duration of the life of the common crotalus? We now know, that the crepitaculum does not give any certain indication of the reptile's age*. In general, very old rattle-snakes have very few bells, or rattles.—What is the best theory of the fact, that the rattle-snake is capable of subsisting for a year, for two years, and even longer, without any *solid* food? Is it not supported by the water which is taken into its system, both by the skin and by the lungs?—What foundation is there for the tales which are so often related, of the fascinating power of this and other serpents? And how far are we to place any dependance upon the relations of Carver, Bossu, and others, concerning the great measure of intelligence of the rattle-snake?—Certainly, there does belong to this reptile, a large share of memory, or if you prefer another expression, of *reminiscence*†.

* See Supplement to a Memoir, &c. pages 38, 39

† See Note D

THAT part of Zoology which is called ICHTHYOLOGY, or the natural history of Fishes, has been extremely neglected in the United-States. This is the more to be regretted, because many of our fishes are peculiar to this portion of the Globe. In particular, there are good reasons for believing, that the great lakes of North-America contain not a few species which are entirely unknown to naturalists. The Ohio, though not rich in the number of species, contains several which have not yet received *scientific* names. I need say nothing of the enormous size of some of the fish of this river, particularly in the genera *Silurus*, and *Esox*.—Even a catalogue of the North-American fish, designating them by their *common* names, is a desideratum which has not yet been supplied. A correct catalogue of the fish of the lakes is especially wanted. Such a catalogue might throw some light upon the ancient state of our continent. The existence of sea-fish in the lakes, *above* the cataract of Niagara, would concur with many other facts, in proving, that our continent was once covered by the ocean. Is it a fact, that there is no species of Eel in any of the lakes above the great cataract?—It is certain that they are by no means common there, as they are in Ontario, and its streams.—I have hinted at the propriety of collecting the common names of our fish. The Anglo—(or rather Europeo) American nomenclature of the same species of fishes is often extremely different, in different parts of the Union. The Indian names of these animals should be sedulously collected. They are often very characteristic of the fish; that is, of some circumstance in its form, its manners, or its food. Thus the Delawares call the Eel, *Schaach-*

a-meek, or the “Slippery-Fish.”—I am of opinion, that no people, in their state of society, were ever better naturalists than the Indians.

The migrations of our fishes, the periods of their arrival in, and their disappearance from, our bays, our rivers, and our creeks; the times of their spawning; the coincidence of these circumstances with the leafing, or the flowering, of particular vegetables, are subjects to which I would wish to direct your attention.—The flowering of the American *Draba**, and of the beautiful *Cercis Canadensis*, is supposed to mark the first appearance of our Shad (*Clupea*) in the rivers Delaware and Schuylkill, near Philadelphia. Hence the common names of these two vegetables, “Shad-Blossom.”—Which species of our fish are migratory? and which are stationary? Are not many of the supposed migratory species residents of our waters, concealing themselves, during the colder seasons, in the mud, among the roots of vegetables, &c.?—Do the two species of Sturgeon (*Acipenser*), which inhabit the Delaware, migrate to the Sea?†—Has not the Salmon (*Salmo Salar*), within the last one hundred years, relinquished some of the rivers in which it was observed by the first settlers of the country?—What is the theory of the well-ascertained fact, that although the Salmon abound in Ontario, and in many of the waters which empty into this great lake, they have never been

* *Draba Americana, mihi*: *Draba hispidula* of Michaux: *Draba Caroliniana* of Walter.

† The Sturgeons of the great lakes appear to be entirely distinct from those of the rivers Hudson and Delaware.

known to penetrate up the Niagara-River, even as far as Queenston, although there is nothing to obstruct their passage, for near nine miles higher up the stream? Have they learned, by a kind of tradition, that the cataract opposes an insurmountable barrier to their migration beyond a certain distance? Is it the noise of the Falls, propagated along the course of the Niagara-river, that deters the fish from moving upwards? Perhaps, we shall discover the solution of the fact in a difference of the temperature of the waters of Ontario and those of the Niagara-river; or in some peculiarity of impregnation of the waters*.—Tables of the comparative usefulness or wholesomeness of different species of our fish, or even of the same species at different seasons of the year, and in different parts of the union, would be a valuable accession to the stock of our knowledge.—The Sturgeon of the southern rivers of Virginia is deemed a much more delicate food than that of the Delaware, though I believe they are specifically the same.—Which of our native species of fish prove poisonous, when eaten? This is a question of much importance, both in a *physiological*, and in a *practical* point of view. And an accurate history of the symptoms produced by such poisonous fish is much wanted†.

THE physiology of the class of fishes opens a wide and very interesting field for inquiry and discovery. Of the *modus generandi* of these animals we are still, in a

* See Note E.

† See the Philadelphia Medical and Physical Journal. Vol. i. Part ii. Art. vi. p. 43—48.

great measure, ignorant. Some new light, however, has lately been thrown upon this curious subject by one of my ingenious pupils, Dr. Henry M. Gray, of Virginia: and I will venture to add, by my brother, Mr. Matthias Barton, of Lancaster, in Pennsylvania. To the first of these gentlemen, we are indebted for the discovery of a small species of *viviparous* fish, whose young, when first excluded from the mother, are in an unfinished, or embryo-like, state. From the latter, I have received some valuable facts respecting the generation of the American Eels (*Muraenae*), and of some species of *Labrus**.

THE respiration of the fishes is by no means completely understood.—Much remains to be done to complete the natural history of the *vesica aëria*, or air-bladder, of many of these animals. What is the precise nature of the air which it contains? Some writers represent it as a pure, oxygenous gas, while some have found it to be azotic gas. In the *Xiphias*, or Sword-fish, the bladder, certainly, does contain an air far from impure, as is shown by the experiments of Dr. Brodbelt†; but Fourcroy found azotic gas in the *vesica* of the carp.—Brodbelt supposes, “that this pure air is to serve the purposes of life, when the animal is

* My brother's drawings of the fish of the river Susquehanna, and its streams (particularly the *Canestoga*), will, certainly, be considered as valuable accessions to the stock of American Ichthyology. It is my intention to publish engravings from these drawings, than which nothing can be more accurate. As the production of an untaught artist, who paints for his amusement, the drawings are uncommonly neat, and even elegant.

† See Duncan's *Annals of Medicine*. Vol. i. Pages 393—395.

far below the surface of the water." But this hypothesis is opposed by many facts.—Are there not minute ducts which lead immediately from the *branchiae*, or gills, of fish into the vesica aëria? Mr. Gotthelf Fischer, a German writer, has published a very curious and ingenious paper on the air-bladder*.

THE heat of fishes, notwithstanding so much has been written upon this subject, is a question still open for further, and more perfect, observations. Between the different species, there is a difference (if we can depend upon the experiments of writers) of at least twenty-five degrees†. A certain French writer proposed to make the heat of fishes a new grade upon the thermometer. The idea was ingenious; but certainly, entitled to little attention, if it be a fact, that the heat of the different species (or at least different genera) is so very various, as has been represented‡.

THERE is a vast chasm in the history of the fishes; a chasm, too, in relation to what I have always deemed the most interesting part of animal natural history: I mean the instincts, or manners, or habits, of animals. How little do we know of the instincts of the fishes! Forgetting that the element in which they live precludes us from acquiring an easy or a rapid acquaintance with the *mores* of the fishes, and not sufficiently modest to ac-

* Versuch ueber die Schwimmblase der Fische. Leipsic: 1795.

† On the scale of Farenheit.

‡ See Note F.

knowledge their own incurious supineness, the best naturalists have fallen into the error, that the fishes are a stupid race of beings; that they discover very little of ingenuity; and that they are, in a great measure, strangers to that *storge*, or powerful affection, by which animals are so generally attached to their young. I venture to assert, that *very much* of what has been said upon these subjects is mere declamation, unsanctioned by enlarged observation, or experience. My own inquiries have convinced me, that we have detruded the fishes to too low a station in the scale of animal intelligence, and of storgal love. The intelligence of the fishes is manifested by numerous circumstances; and, if this were the proper place to enter on the inquiry, I could lay before you well-authenticated facts in regard to the solicitous care which some of our native Siluri, Labri, &c., manifest for their young; facts which would almost lead you to believe, that what is said of the *Cottus Gobio* of Europe* is not a fable.—Let me beg of you, then, to devote a portion of the time, which you may be able to spare for the cultivation of natural history, to a candid vindication of the fishes from the aspersions of ignorant, of lazy, or of systematic, naturalists. The facts for this vindication you will often find it easy to procure; from the friends with whom you may associate: or you will meet with them in those hours which some of you will, doubtless, devote to piscatory pleasures.

* Speaking of this fish, which the English call Bull-head, and Miller's-thumb, Linnæus says, "Nidum in fundo format, ovis incubat prius vitam deserturus, quam nidum." *Systema Naturæ*. tom. i. p. 452. Editio. xiii.

ENTOMOLOGY is by no means the least important department of Zoology. For in the class of Insects are arranged some of the greatest enemies to the labours and industry of man. Infinitely more powerful, or at least more pernicious, and more difficult to subdue, are the small insects which lay waste our fields, our gardens, and our forests, than the largest and most ferocious quadrupeds in the order of the *Ferae*. Man is capable, by the exercise of the strong arm which nature has given him, of subduing the Lion and the Tyger: the tyrants of the forest. It is even in the power of man to exterminate the *whole species* of these animals. That he has not already done it, is only a proof, that he has been slow and sluggish in attaining that culture and that perfection, for which nature has destined him.

BUT far different is the relation which subsists between man and the insects. They are, I repeat it, his greatest enemies. This remark, at least, applies to thousands of the species that are already known. And how much mischief is occasioned by hundreds of other species, which have, hitherto, escaped the researches! which may have even eluded the keen eye, of the naturalist!

NOTWITHSTANDING the importance of the science of Entomology, the history of our insects has, hitherto, solicited but little attention. It is true, however, that considerable progress has been made in collecting, in naming, and in marking by *external* characters, the insects of the United-States. But it is not likely that even the catalogue of our insects will be completed in our

times. And, indeed, more important subjects, relative to these animals, demand the attention of Americans, whether as naturalists, as agriculturalists, or even as mere lovers of the beauties of vegetation.

It is an object of the first importance to investigate the natural history of those insects which are particularly injurious to us, in any way. Unfortunately, our country, as much perhaps as any on this globe, abounds in such insects. I shall here mention a few (a very few, indeed) of those which are especially worthy of the attention of philosophical or useful naturalists.

THESE are the Hessian-fly, an insect, I believe, peculiar to America. The Moth (*Tinia granella*) which has, at various periods, committed such havoc upon the grain of the wheat, the rye, and the barley, after these grains have ripened, and have been taken from the field. The different larvae, the *Cimex*, and other insects, which destroy the most important of all the *cerealia* that are cultivated in America: I mean the Mays, or Indian-corn. The *Bruchus Pisi*, or Pea-Bug, which proves so destructive to the common cultivated Pea (*Pisum sativum*). The *Zygaena*,^α a lepidopterous insect, which attacks the bark and the wood of the peach-tree, and concurring with other circumstances, such as the variableness and extreme cold of our climates, occasions the premature decay of these invaluable trees, in almost every part of the United-States. The coleopterous insects, the Canker-worm (*Phalaena*), and others which destroy our apple-trees; the different species of *Curculio*, or Weevil, which attack, and occasion the fall of, the infant fruit of the Plumb, the Nectarine, the

Cherry, and many of our other fruits: various other coleopterous insects, which destroy the valuable timber of the country, particularly the Locust (*Robinia Pseud-Acacia*), the Ash (*Fraxinus*), the Beach (*Fagus ferruginea*), different species of Hickery (*Juglans*), &c.—Surely, no subject is more worthy of attention than that which relates to the means of *preventing*, or of very essentially *limiting*, the ravages of such insects: and I believe it is a fact, that the only effectual means of accomplishing these desirable ends, are to be acquired through the medium of an exact acquaintance with the natural history of the insects*.

LET us not, however, complain of the insects as if none of them were *useful* to us. Some of those very insects which infest our vegetation may be, and in all probability are, highly beneficial to us, by destroying the *exuberant* growth of a country. But waving the consideration of this idea, we know, with certainty, that some of our insects, of whose ravages we have been wont to complain, have already been turned to very useful purposes, in medicine. The *Lytta vittata*, which we call “Potatoo-fly,” is not only an excellent substitute for the best cantharides of the shops, to which genus it belongs, but is, I believe, a more powerful vesicatory. It may be kept for years, without its properties being essentially impaired. Besides this, we have several other species of the same genus. Such is the *Lytta marginata*, the *Lytta cinerea*, and the *Lytta atrata*. The two former of these species are still more powerful than the *Lytta vittata*, but have not yet been discov-

* See Note G.

ered in sufficient quantity to answer the demands of medicine.—*Lytta vittata* is one of our most common insects. It extends from the New-England States into the Carolinas, and Georgia, and, in all probability, much further south. It feeds upon a great variety of vegetables (both wild and cultivated), belonging to the most opposite natural families of the *Luridae*, the *Umbelliferae*, the *Atriplices*, the *Amaranthi*, the *Ranunculaceae*, &c., &c. I have now satisfied myself, by actual experiments, that the activity of our most powerful species of *Lytta* is not, in any essential degree, dependent upon the acrimony of the plants upon which these insects feed*. They are equally active whether they feed upon the acrid Clematides, which of themselves, induce vesication, or upon the mild and esculent Beat, or the mucilaginous Malva.

AN accurate description and history of the *insecta vesicatoria*, which I have mentioned, (and we, no doubt, possess many others), could not fail to be an acceptable present to naturalists and physicians.

INDEPENDENTLY on the evils which they inflict, or the good to which they may be converted, there are several of our insects which are eminently entitled to the attention of philosophical naturalists. Of these, I shall only mention one, the Periodical Locust of our country: the Cicada Septendecim of Linnæus. The history of this insect, so far as it is known to us, is one of the most singular with which we are acquainted. It returns, in immense periodical swarms, after an absence of six-

* See Elements of Botany, &c. Part iii. p. 70.

teen or seventeen years, in particular districts of our country. The greater part of this long period, it passes in the earth, where its life is, in all probability, nearly as tranquil, and undisturbed, as that of the Seed, before it has begun to vegetate.—A well-written history of this Cicada (or Tettigonia), together with that of some other species, or genera, nearly allied to it, would be a most interesting present to the philosophical world*.

OF the great class of VERMES of Linnæus, which may, I think, very properly be considered as an aggregate of *several distinct* classes of animals, I have very little to say, in this place: not that the subject is a barren one; but because it is so immensely extensive; because it can only be investigated with much labour and attention; and because, by reason of the richness of the field, it is difficult to say, which are the subjects, under this head, to which you should particularly, and primarily, devote your attention.

SOME of the remarks which I have to make, in regard to this class of animated nature, are deferred to the head of our Geology. Indeed, owing to the great revolutions which our globe has undergone, there is an intimate, and even a *necessary*, connection between Geology and that part of Zoology, which for want of a better general name, I might denominate ELMINTHOLOGY. In other words, the images of the Vermes are so extensively impressed upon the materials of our *former*

* See Note H.

globe, that their history will ever go hand in hand, with the studies of the geologist and mineralogist.

I CANNOT here undertake to point out to you, as I have done in regard to the preceding classes, *particular* subjects for your investigation, and inquiry. Indeed, the situation of many of you, at a distance from the Ocean, the great empire of the Vermes, will prevent you from cultivating this branch of natural history with the same success as the others, independently of the difficulty of the subject. I will only, therefore, observe, that the laws and phenomena of life will be studied with great advantage by an attention to the class of Vermes; and that some of the animals of this class are particularly entitled to your attention, as physicians. It is the vermes which *intermix*, as it were, with the great series of vegetables; which lend their characters to the plants, which borrow characters from them in return. “*Natura non facit saltum:*” “Nature does not make sudden transitions,” is an aphorism, the truth and value of which are best perceived by the naturalist who has studied the life and the properties of the vast families of the vermes, and the kingdom of the plants.

IN speaking of the insects, I observed, that they are “the greatest enemies to the labours and industry of man.” Of the Vermes it may be said, that many of them enter, as it were, into the very composition of man, inhabiting our fluids, and taking possession of the cavities of our bodies. What fluid of the body is not the residence of myriads of vermes? Fortunately for us, the greater number of these are our *innocent* companions, in life. But, on the other hand, in the cavities of our

bodies, and in the very substance of some of our viscera, we find vermes, whose history, by reason of the evils which they inflict upon man, it is important to study. I need not mention, in this place, the vermes of the human alimentary canal. The evils which these occasion are, I believe, much greater than many physicians imagine. Unphilosophical and trifling is the notion, that the vermes of the intestines are salutary inmates of our constitution!

I WILL conclude this subject by observing, that a patient of mine* discharged, when under the operation of powerful anthelmintic medicines, several individuals of that particular kind of worm which is called the *Trichocephalus hominis*: a worm which I have not, hitherto, heard mentioned as a native of the United-States, though it is highly probable, that it is by no means uncommon among us.

BOTANY.

BOTANY has, certainly, been cultivated, with more attention and success, in the United-States, than any other branch of Natural History. The earliest naturalists of our country were chiefly attentive to the examination of the indigenous vegetables. We claimed a Colden, a Clayton, and a Bartram†, long before we could boast of a single zoologist, or a mineralogist. The *Flora* of the United-States is, indeed, perhaps as com-

* An Infant at the breast.

† John Bartram. Of this gentleman some interesting notices may be seen in the Philadelphia Medical and Physical Journal. Vol. i. Part. i. p. 115, &c.

plete as that of some of the countries of Europe, and unquestionably, as complete as that of many of the countries of Asia. I say nothing of Africa, and of the continent of Australasia. The vegetables of these countries are very imperfectly known to us.

BUT although, through the labours of many ingenious and industrious botanists, the vegetables of the United-States have been considerably attended to, our FLORA is far from being complete. On the contrary, it presents to future cultivators, an immense field of discovery. Even our forest-trees, and such as are constantly presented to our view, are very imperfectly known, and scarcely defined by appropriate characters. It is true that our Oaks have lately been attended to by Mr. Michaux, in a work of real merit. But not a few of our species of this family of plants, and many of the varieties, have escaped the observation of this industrious botanist. Neither have the properties of those which he has described, been sufficiently attended to. Our native species of Juglans, our Magnoliae, our Vaccinia, Andromedae, and Hyperica, deserve to be attended to, in separate *Monographiae*. From my own inquiries, in various parts of the United-States, I am persuaded, that a very considerable number of our native plants is still unnoticed. This remark applies, with peculiar force, to the American plants of Linnæus's 24th class, which he calls Cryptogamia; to the *Gramina*, or Grasses, and to our Alpine plants. With respect to the Cryptogamia there is ample room for inquiry.—My own American *Herbarium* contains several hundred species of North-American plants more than are contained in the whole *Flora* of Mr. Michaux. Through

the kindness of my friends and pupils, I am continually receiving accessions to the list. The history of my whole collection is intended for the public. Indeed, I have already made considerable progress in describing our plants.

WHEN we consider the great extent of the United-States, even excluding the country beyond the Mississippi, I presume it may be stated, at a moderate calculation, that, at least, one eighth part of our native vegetables is entirely unknown; *certainly to the botanists of Europe*. And with respect to the regions between the Mississippi, and the Ocean, the botany is still more imperfect. Hitherto, these countries have not been explored by men competent to the task of telling us what are their vegetable or other riches. But this vast region will, unquestionably, afford much for the gratification of the botanist. In its higher latitudes, we may expect to find many of the vegetables of the north and east of Asia; as we have already found, in those latitudes, many of the animals of Asia*; and in the lower latitudes we shall, in all probability, meet with many of the plants of China, and Japan, of Cochin-China, Hindoostan, and other regions of the old world.

WE are interested, however, in other inquiries than those which respect the mere collection, the nomenclature, or the systematic arrangement, of our plants. Among these inquiries, there is one for which it is peculiarly important to collect materials: and for this pur-

* See Note I.

pose valuable materials may easily be collected. I mean a Geographical View of our vegetables.

By a geographical view of vegetables, I mean an arrangement of vegetables according to the extent of country which they occupy from north to south, and from east to west; as well as according to their altitude above the level of the sea. Such an inquiry would, of course, involve much curious and important matter relative to the nature of the soil, and climate of the country.

To this subject I have devoted much sedulous attention. In the month of February, 1800, I read to the Philosophical Society an extensive memoir, entitled *A Geographical View of the Trees and Shrubs of North-America*. Hitherto, I have not published this memoir, from a desire to render it more perfect. The truth is, that much remains to be collected relative to the diffusion of our vegetables, before any thing like a *finished* geographical view of them can be published. But I repeat it: many important materials for such a work may be collected, with great ease. How easy is it, for instance, to determine the most northern (native) limits of our Live-Oak (*Quercus virens*), and of the Long-Moss (*Tillandsia usneoides*)? How easy to determine the southern limits of the Sugar-Maple (*Acer saccharum*)? How easy to mark the eastern boundary of *Menziesia ferruginea*, *Æsculus flava*, which we call Buck-eye, and many others. The most northern latitudes, along the sea-coast, of our native *Palmae* are also known; and we are even capable of determining, with considerable certainty, where, in the country west of the Mississippi,

many of our common Atlantic vegetables entirely disappear.

I CONSIDER the geographical view of vegetables as one of the most curious, and at the same time as one of the richest, subjects in the phytology of a country. It is intimately connected (as I have already hinted) with whatever relates to the soil and climate of a country, and, of course, with the proper management, or culture, of vegetables. It will aid us essentially in constructing a rational geology of a country, or at least it will assist us in arriving at a better knowledge of the revolutions which our globe has undergone. Thus, from a mere attention to the vegetables of the north-eastern parts of Asia and the north-western parts of America, we should conclude, that these two continents had once been united to each other: for many of the vegetables of these regions of the old and new world are *specifically* the same; and where this is not the case, we find a remarkable coincidence in the *genera*.—The geographical view of vegetables, in the first settlement of a country, is peculiarly important. It tells us what are the natural situations of vegetables, before man has begun to lend his aid in diffusing them from one place to another. It will put our posterity in possession of many interesting facts relative to the progressive migrations of vegetables, independently of the aid of man. I believe it to be a fact, that in proportion as the country between the great ranges of our mountains and the Atlantic has become *cleared* and cultivated, there has been a *natural* interchange of the vegetables of these opposite regions.—But I cannot dwell, in this place, upon the precise ob-

jects or the importance of this subject, the discussion of which would demand a great deal of time.

SUBJECTS of a still more practical nature present themselves to our view. Whatever relates to the *usus* of our plants is eminently entitled to attention. The medical properties of many of these plants have never been properly investigated. Of many others the medical properties are entirely unknown to us. And who will doubt that on this subject much may be done? when it is remembered, that some of the most valuable articles of the *materia medica*, are either natives of the United-States, or may be supposed, from what we know of their native countries, to grow within the limits of the Union. Such are the Jalap (*Convolvulus Jalappa*), the Seneca Snake-root (*Polygala Senega*), the Carolina Pink-root (*Spigelia Marilandica*), various species of Gentian (*Gentiana linearis*, &c.), not to mention many others.

I do not mean to contend, that remedies for *all* our diseases are to be discovered within the limits of the United-States. But I cannot doubt, that among the vegetable treasures which nature has bestowed upon us, many important remedies will be discovered. I have elsewhere shown*, that our Indians are in possession of many useful medicines. However imperfect the state of medicine among these people, however rude or empirical their practice in the employment of their remedies, we may derive essential advantage by studying

* See Collections for an Essay towards a *Materia Medica* of the United States. Part ii. Preface, p. 12, &c.

the history of medicine among the Indians. Slow, indeed, would be the progress of the MATERIA MEDICA; wretched and shackled the state of medicine itself, if we refused to receive medicines from a people, merely because they were incapable of teaching us the whole nature of their remedies, and could offer no satisfactory theory to explain the mode of their action upon the system.

WE are the inhabitants of a country peculiarly blessed by the allwise and benevolent Creator of the universe. He has given us an abundance of valuable esculent herbs, and roots, and fruits, of various kinds: and our soil and climate are admirably adapted to the growth of many others, which are not indigenous. But we trample under feet, our native esculents, or merely look upon them, without knowing their properties; or, at least, without paying any attention to them. Thus the *Zizania* of the lakes, which serves as the chief vegetable food of the *Meenomeneyuk*, or *Folles-Avoines*, is wholly unattended to by us. Yet there are reasons to believe, that this grain, if taken under the culture of man, and transferred to other and milder climates, would prove a most valuable addition to the stock of our cerealia. The rice, the wheat, the rye and the barley, in their native soils, and in the wild hands of nature, were, in all probability, as little entitled to attention. More capable of supporting the colds of the northern climates than the rice, it should be transferred to those regions where the rice will not grow, and where poverty is the lot of the inhabitants*.——Some of our native Legumi-

* See Note K.

na, both seeds and roots, are also deserving of attention. Such are some of our native species of *Dolichos*, in the southern states; the *Glycine Apios*, which we call Wild-potatoe, not to mention others. If I do not greatly mistake, some of our native *Convolvuli*, (perhaps *Convolvulus panduratus*, called Yams and Hog-potatoe, might be used as substitutes for the Sweet-Potatoe (*Convolvulus Batatas*.) Some measures ought to be taken to preserve that large subterranean Tuber, which is called Tuck-a-hoe* in Virginia, and other parts of the Union. The Indians made bread of this vegetable production, and I am assured, that a most delicious cake is prepared by mixing with the farinaceous matter of the Tuck-a-hoe a portion of rice-meal.—The natural history of this vegetable, together with its chemical analysis, would be well received by the public.

SOME of our native fruits are likewise well worthy of attention. Such are the Persimmon (*Diospyros Virginiana*), the Chickasah-Plumb†, some species of *Annona*, or Custard-Apple, some of our *Ribes*, or Currant, and of *Vitis*, or Grape. Our finest native Grape is the southern species which I call *Vitis punctata*. This is particularly worthy of attention.

I HAVE recommended an inquiry into the medicines of the Indians. I would also now suggest the propriety of an inquiry into their *materia alimentaria*. No doubt,

* “*Tubera Terræ maxima, externe pulla & scabra, intus candida. Ad panem conficiendum Indi utuntur, vulgo Tuckahoo.*” Clayton, in the *Flora Virginica*, &c. p. 176. quarto edition of 1762.

† *Prunus Chicasa* of Michaux.

we live much better than the Indians do: but they are nevertheless capable of furnishing us with some good and pleasant dishes. Some substantial dishes we have got from them, and we have even condescended to retain their names of those dishes. Their whortle-berry bread might be used in other times than times of scarcity. They made bread from the fruit of the *Diospyros*, of the root of a species of *Convolvulus*, which grows in the southern states, in the low cane-grounds; of the root of a species of *Smilax*; and I have already said that they used the Tuckahoe. The Hickery-milk of the Southern Indians would not, I suspect, disgust the palate of the nicest epicure. Their compound of the flour of Mays and honey would at least be nutritious.—I could mention an Indian receipt for making a Beer, which they drank before the Whites came among them. But I believe, it is on all hands allowed, that we excel the Indians in the *manufactory* of strong drinks.—The acorn of a variety of Michaux's *Quercus macrocarpa*, is one of the principal nutritious articles of the Panis and other Indian tribes, in the trans-Mississippi part of the United-States. In pursuit of this vegetable, the Indians are accustomed to make regular migrations of some hundred miles. How important is it to attend to the cultivation and preservation of such a vegetable! The tree I allude to grows within the limits of Pennsylvania, and in many other parts of the United-States.

In times of scarcity, the Indians are known to have recourse to many native fruits, roots, &c. They eat the young shoots of some species of *Canna*, or Indian-Reed; and make bread of the acorns of the Live-oak, or *Quercus*

virens. They eat the roots of *Hydrophyllum Canadense*. About Chatham, in New-Jersey, are still to be seen the pebble-pavements upon which they baked the large roots of an aquatic plant, which served them as bread. This plant, which they called *Mockshaurw*, is not, with certainty, known to me. Perhaps, it is *Nymphæa advena*, which we call Can-Dock, and Splatter-Dock. Perhaps, it is a species of *Calla*, or of *Arum*. It is not *Sagittaria sagittifolia*. With the bulbous roots of this last-mentioned plant, so universally distributed over the world, the Indians are well acquainted. We should imitate them, more generally than we do, in the collection and eating of this root, which is hardly inferior to the finest potatoe*.

THE Indians had their sallads. The "Shawnee-Sallad," and the "Indian Sallad" of the States of Kentucky, Ohio, &c., are not thoroughly known to me. They are praised by the White-settlers.

BUT there is one subject connected with the botany of our country, which is so important, that it ought not to be any longer neglected. I mean the catalogue of those wild plants, every where spread before us, which our cattle carefully select, as good and wholesome food. The number of these plants is, certainly, very great. And what is distressing, many of them have not yet received any common names, and the farmer, or the grazier, does not know them, when he sees them. In my botanical excursions, in my solitary rides, I never neglect to watch the appetite of my horse. How

* See Note L.

carefully does he select his food !! Like a good botanist, he knows the plants, though he has never before seen them. On the rich hills of Virginia, the *Collinsonia Canadensis*, which is there called "Rich-weed," affords a most excellent pasture for the horses and horned-cattle. They grow fat upon it very fast, and also improve in their health. But no pains are taken to preserve this plant, nor any of the valuable native *Hedysara*, which we call "Pea-Vines." Indeed, in many parts of our country, these plants, as well as the Buffaloe-Clover, and many others, are in a fair way of being totally exterminated*.

It is much to be wished, that some intelligent and industrious naturalist (perhaps, the task is too extensive for any one person) would furnish us with a set of tables of the wild plants of our country, pointing out the places of their growth, and carefully giving, where this can be done, the common or vulgar names of the plants; and noticing, in connection with these circumstances, what plants are eaten, and which are rejected, by the domesticated animals, especially the horse, the ox, and the sheep. Such tables have been published in different parts of Europe. The *Pan Suecus* of Linnæus is one of the most important specimens of the kind. Never will the agriculture of our country be properly understood, or economically attended to, until something on this plan is attempted in the United-States. We have a striking instance of the value of such inquiries in a paper by the late Dr. Pulteney. The *Ranunculus aquatilis*, or Water-Crow-foot, had always been deemed one of the most

* See Note M.

worthless of plants. It frequently choakes up the channels of streams or creeks in England, and was thrown out of the water, with much labour, merely to rot. But the respectable physician and botanist whose name I have mentioned, has shown us, that in some parts of England, this long-neglected plant is the principal food of the cattle, and gives abundance of excellent milk*. This *Ranunculus* grows in the vicinity of Philadelphia; but none of our farmers or graziers think of feeding their cattle with it. We talk incessantly of the benevolence of Providence: but, really, from an inattention to his works, a large proportion of what we say, is mere theoretical or habitual declamation. But how abundant is the display of that benevolence, when we see almost every weed, even the vilest, and seemingly most useless, even those which are poisonous to man, affording subsistence to other animals, and, through the medium of some of these animals, even to man himself!!

THE United-States possess many colouring plants, or *Plantae tinctoriae*. The list of those which are already known to us, is by no means small. One of the most important is the bark of the *Quercus tinctoria*, which is now very extensively used in the British manufacturing houses, by the name of quercitron-bark. It is employed for dyeing various shades of yellow; and such is its value, that it bids fair to supercede most of the other yellow dyes, the *Reseda Luteola*, or Weld, not excepted.—How many years passed away, before the dye property of this common tree, which is daily felled in the forest for the use of the tanner, and for fuel, excited any great atten-

* See Transactions of the Linnean Society of London.

tion!—The bark of one of our species of Hickery (*Juglans*) is now considerably employed among us to give a fine yellow ground to paper-hangings. The colour which it imparts is more brilliant than that of the *Quercus tinctoria*. Good colouring matters are furnished by some of our Maples, by the common Black-Walnut (*Juglans nigra*), &c. The *Zanthorhiza apiifolia*, the *Hydrastis Canadensis*, the *Virgilia* of Tennessee, the Yellow-wood of Louisiana, the *Helleborus trifolius*, the *Batschia*, or *Clinanchee* of the Indians; the *Galium tinctorium*, the *Heritiera Gmelini*, the *Betula serrulata*, are but a few of the known vegetable dyes of North-America. Even the *Phytolacca*, one of our most common plants, has not been sufficiently attended to. Hitherto, no successful experiments have been made to fix the colouring matter of the berries of this plant. But may not this be done by the aid of some of those mordants which Chemistry furnishes us with? A finer colouring matter we do not possess.—It is well known that a tolerable substitute for indigo has been obtained from the *Podalyria tinctoria*, one of the more common of the North-American plants. From another species of the same genus, the *Podalyria australis*, which grows abundantly upon the rivers Shenandoah, Potomack, &c., I have produced a better fecula*.

GEOLOGY, AND MINERALOGY.

OF all the branches of natural history, there is not one which has been cultivated with so little attention, zeal, or success, in the United-States, as Geology, or Mine-

* See Note N.

ralogy. This, however, is a science of great curiosity and importance, and is, in an especial manner, entitled to the notice of Americans.

UNDER this head, it is rather difficult to say what is most worthy of being attended to, as almost every thing is new. The geologist, however, will find ample scope for his researches in investigating the mountains of our country. These have never been examined in a philosophical manner. Even the most prevailing materials of which they are composed, is a desideratum in the natural history of our country. I believe, it will be found, that the North-American mountains are much less granitical than mountains of similar heights, in other parts of the world. Much has been said respecting the vestiges of volcanoes among the mountains of the United-States. On this subject, however, we are in want of specific information. In all my examinations of our mountains, in various parts of the Union, from the latitude of 43° to that of 38° , I have not met with a single appearance, that I should ascribe to a volcanic cause, except, perhaps, in the neighbourhood of the North-mountain, in Virginia. On many of our mountains, indeed, we discover regularly figured basaltic stones: but the volcanic origin of these is now pretty generally deserted. Having mentioned basaltes, I cannot help expressing a wish, that the famous "Wall", as it is called, in North-Carolina, were more carefully examined. The idea which I first threw out, many years ago, respecting the nature of this wall, that it is not *artificial*, but of basaltic origin, is now admitted by most of those who have written or reflected on the subject. But accurate

plans of this wall, together with more finished descriptions, are desiderata in the GEOLOGY of the country*.

THE petrifications and impressions which are found upon many of our mountains form a most interesting subject of inquiry. I possess a large collection of such impressions, &c.; and I consider them as some of the most interesting medals of the revolutions which our country has undergone. It is, in fact, only by a very critical attention to these medals, that we shall ever be able to form a correct theory of our earth.

THAT I may not appear to overrate the value of this study, I would here observe, that I possess specimens of slate found in Pennsylvania, upon which are distinctly impressed several of the Filices, or Ferns, of South-America and Jamaica; and my cabinet is enriched with a large mass of freestone with the distinct impression of some immense species of Cactus, or Indian-Fig, not now known to exist in any country. This specimen was found about one hundred and twenty miles northwest of Philadelphia.

THE vallies of our continent are hardly less worthy of investigation than the mountains. Some of these vallies, such as the great vale, which extends from Hudson-river, through New-Jersey, Pennsylvania, Maryland, and Virginia, and even into North-Carolina, there are many good reasons for supposing, were once arms of the sea. An examination of the strata which they cor-

* See Note O.

tain, and the various *exuviae*, which are imbedded in these strata, are well worthy of our attention. In the neighbourhood of Chambersburg and Winchester, the limestone contains *Cornua-ammonis*, of different sizes. And the impressions of *Sertulariæ*, *Madrepores*, *Cel-lepores*, *Tubipores*, *Echini*, and many other marine animals, are abundantly distributed in the calcareous pavement of the valley, all the way from the neighbourhood of Easton, in Pennsylvania, to the first streams of the Roanoke in Virginia. Certainly, this great Valley,—now one of the fairest and most fertile regions of North-America, possessed by a race of men, virtuous in industry and morals, and rich in LIBERTY,—was once the domain of the Sea, and the refuge and a portion of the empire of her animals, whose death and destruction now largely administer to the comforts and happiness of man*.

I CALL upon those of you who are interested in geological inquiries, to attend to the arrangement of the strata of different kinds, in every part of our country. This is a very curious subject of inquiry. As early as the year 1785, I paid particular attention to this subject, in the western parts of Pennsylvania, Virginia, and in the country north of the Ohio, &c. I remarked, that the strata in the countries west of the great Alleghany-mountains, are, in general, horizontally disposed, while the strata, of the same materials, in the countries between the mountains and the Atlantic, are almost all disrupted, or placed at an angle of about 45°. Mr. Volney, with-

* See Note P

out any acknowledgment from whence he received it, has published my theory, or rather my hypothesis, on the subject. But more mature and enlarged inquiries have since convinced me, that the theory which the eloquent French traveller has published in his *Tableau**, is of much less importance than I had imagined. I have, in another place, delivered my sentiments more at large, on this subject†.

THE very different arrangement, then, of the strata of stony matters, of coal, of iron-ore, &c., in the countries on both sides of the Alleghany-Mountains, is one of those great features in our country, for which we have not yet been able to give a satisfactory theory. But I doubt if such a theory be beyond the reach or grasp of science. We shall, at some future period, possess a correct theory of the earth. But such a theory is not to be attained, by the mere aid of genius, or imagination, in a cabinet of little fragments of stones, of earths, and of metals. Nature disdains to be courted in this way. She will not answer us unless we interrogate her, in all the wild and majestic scenery of her works: on mountains, in vallies, in caverns, and in mines. Thither she calls the genius and the powers of her favourite geologists. To them, toil, in pursuit of facts and truth, is luxury and pleasure. Lesser minds hang over romantic and visionary volumes; and sicken, with the burnings of their own or another's imagination, amidst specimens upon which nothing legible is written, or impressed.

* *Tableau du Climat et du Sol des Etats-Unis d' Amerique.*

† See the *Philadelphia Medical and Physical Journal*. Vol. i. Parti. Art. xvii p. 60, &c.

THERE cannot be a doubt, that the United-States possess within their limits, many important minerals, which might be applied to various useful purposes. In many parts of the country, vast collections of coal have already been discovered; and beds or strata of this useful fossil are daily discovered in other places, where before they were not known to exist. That important substance, gypsum, or plaister of Paris, is now known to exist in various parts of the United-States. I have found it, in great abundance, at the Falls of Niagara. It is likewise found, upon the same slope, at the falls of the Jenisseia-river; and I have received fine specimens of it from the Outlet of the Owasco-lake, in the State of New-York. No doubt, large quantities of this substance will be found among the limestone of our country, particularly perhaps in the counties of Lancaster and Dauphin, in Pennsylvania; and in the great valley of Berkeley, in Virginia, where, along with the common carbonates of lime, we discover immense quantities of cubic pyrites, and pyrites in other shapes.—Having mentioned the limestones, I would suggest the propriety of examining different parcels of these with great attention, as the subject is one of so much practical importance. Our farmers seem divided in opinion concerning the use of lime, as a manure. It will, in all probability be found, that some of our limestone, like that of Bredon in England, is contaminated with magnesia, which may in some measure account for the diversity of opinion among the farmers. The existence of magnesia among the limestone of Pennsylvania, in particular, is rendered highly probable, by the circumstance, that the edges of the strata of limestone are often known to be skirted

with mica, steatites, and other magnesian genera of stones.—But I do not mean to assert, positively, that magnesian limestones (if I may so call them) are less favourable to vegetation than the more pure limestones. On the contrary, some experiments lead me to believe, that magnesia is much less unfavourable to vegetation than is generally imagined.

WITHIN a few years, we have become acquainted with the existence of immense quantities of a fine Porcellana, or porcelane-earth, in the state of Maryland. It is found, in close connection with mines of iron-ore, near the foot of the South-mountain. It evidently owes its origin to a decomposed granite. I have received specimens of the same species of earth, by the name of Chalk, from the neighbourhood of other mountains, in Virginia. It is probable, that it has an extensive range in America. There can be no doubt that this earth will, at some future period, be applied to the manufacture of beautiful vessels, or ware, of various kinds*.

PLUMBAGO, or Black-lead, has been discovered in the vicinity of Philadelphia, and in other parts of the Union: and Cinnabar is said to have been found in Virginia. Our lead and other mines furnish us with an abundance of Sulphat of Barytes. In short, almost every day brings us acquainted with some mineral with whose existence, in this country, we had previously no knowledge.

I NEED say nothing of our mines of Iron, Copper, Lead, Gold, and other metals. Perhaps, no part of the

* See Note Q.

world is richer in iron than Pennsylvania, and some other parts of the United-States. Copper and lead are by no means rare. Gold, in considerable quantities, has been discovered. Tin and Antimony have been found in Pennsylvania ; but, hitherto, I believe, in very small quantity*.

SOME of our minerals have not, hitherto, been discovered in other parts of the world. Such is the Colum-bium, of which Mr. Hatchett has given the analysis. The specimen of this new metallic body, which the able and ingenious English chemist examined, was sent from some part of New-England, about an hundred years ago. Since this period, no other specimens of it have been seen in Europe. I need hardly call upon the ardour of the young mineralogist to search and inquire about this substance, of which it is highly probable that specimens are often to be met with, in some part, or parts, of the New-England States.

UNDER this head of the mineralogy of our country, it may not be improper to turn your attention to the nature of the various Mineral Springs which are so abundantly distributed through the United-States, but particularly, perhaps, in the States of New-York and Virginia. Analyses of some of these springs have, indeed, been published. But none of these analyses are sufficiently correct, or extensive. Of the water of the Cape-Capon-Springs, in the State of Virginia, we have not yet any analysis: yet this is, perhaps, one of the most

* See Note R.

important of all the known North-American mineral waters.

OUR bituminous or naphtha springs are entitled to attention, in a philosophical, if not in a medical, point of view. Some of those in the State of New-York, by flowing upon great beds of madrepores, below the surface of the earth, furnish the naturalist with very interesting specimens for his cabinet. Such specimens I possess, and the theory of their impregnation is very obvious. The specimens themselves are indubitable proofs of a theory at which I am now to hint.

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IN concluding these few and imperfect hints on the two heads of our geology, and mineralogy, I would suggest the propriety of collecting, with sedulous care, the *traditional* knowledge of our Indians concerning the changes which the continent has undergone. I am far from insinuating, that such traditions should be received as *pure history* : but I am persuaded that, on some occasions, much interesting information might be educed from them. The Indian tradition of a vast serpent which passed through Lake-Erie, and over the cataract of Niagara, unquestionably refers to some great change which has taken place in the Falls. They say, that their fathers have told them, that lake Erie and all the other great lakes were once much more extensive than they are at present. Now every geological appearance favours this opinion.—The Indians of the State of New-York preserve a tradition, that the country about

Newburgh, on the North or Hudson-river, was once a Lake; and that, in process of time, the waters of this lake broke their way through the mountains, now called the "Highlands," and thus gave origin to the great and important river which I have just mentioned. Others of the Indians say, that the Hudson-river now passes over land which was once dry, and that a great noise, of three days continuance, preceded and accompanied the raging flow of the waters, during which many Indians perished. I deem these traditions highly important. In fact, the appearances about Newburgh render it more than probable, that there was once a vast lake back of the mountains there; and I have no doubt of the irruption of the waters through the mountains at this particular spot: an event which, perhaps, is not of so very remote an era as might be supposed, and during which not only many of the human inhabitants, but also some of those large quadrupeds, whose remains are found along the North-river, may have perished*. We cannot, I say, place too high a value upon the Indian traditions of this kind. To a discerning and virtuous naturalist, they are like mines, among the rubbish of which we dig, with success, for the most precious metals. Do not suffer yourselves to be deterred from noting down the Indian traditions, relative to these and other points, however extravagant they may seem to be, by the sneers of little, intemperate philosophers, who, without candour to receive, or ability to discuss, traditional tales, would throw a veil of doubt upon those very points,—the origin of mankind, their dispersion over the globe, the physical revolutions of the globe itself,—

* See Note S.

which are among the most interesting to which philosophers can attach themselves. The tradition of the Carolina-Indians, concerning their beloved Yaupon*, and that of the Iroquois concerning their Tobacco, are of more importance, in regard to the intercourse that has once subsisted between the old and new world, than all the pages of *Le Philosophe Douceur*, Bernard Romans, M. de Voltaire, and others, on the same subject.

METEOROLOGY.

WHATEVER relates to the Meteorology of our country is eminently entitled to our attention. To increase the quantity of knowledge in this interesting department of natural history, the Society should furnish itself with a good thermometer, barometer, and hygrometer, which might be placed in the hands of one of the curators, whose business it should be to notice, with all possible care, the states or changes of the weather, so far as they are indicated, or may be ascertained, by these instruments; and to deliver into the Society, at least once every year, a register of his observations. Similar observations by the members, in different parts of the Union, would likewise be acceptable, and the whole would serve as a foundation upon which, at some future period, a complete history of our climate might be constructed. I would also propose, that a rain-gage, to estimate the annual or monthly quantity of rain that may

* See Collections for an Essay towards a Materia Medica of the United-States. Part First, pages 56—58.

fall in this city, or its neighbourhood, should be kept at the expence of the Society.

It is a point which may, I think, admit of some doubt, whether any very essential change has actually taken place in the temperature of the American climates, since the first discovery of the continent by the Europeans, in the fifteenth century; or, at least, since the first settlement of the European colonies, now called the United-States. Many facts and materials for determining this point may still be collected. For this purpose, it is obvious to propose, that inquiries should be made of the oldest people residing in the Union; but, in particular, inquiries of our Indians, who are remarkably attentive to the preservation of the memory of severe winters, uncommonly warm summers, seasons of great rain, of great drought, and other circumstances relative to the atmosphere. These inquiries might be conducted with peculiar advantage, in the southern parts of the United-States, where several of the Indian tribes, such as the Cheerake, the Chikkasah, &c., are known to have resided, in particular districts of country, for near three hundred years. Mr. Lawson informs us, that when he was in North-Carolina, in the very first years of the eighteenth century, the Indians of that country preserved the memory of an uncommonly hard winter, which had occurred there one hundred and five years before. This carries us back to about the year 1596, in the reign of Queen Elizabeth, at which time there were no European settlers in Carolina. At that time, according to the tradition, "the great Sound was frozen over, and the Wild Geese came into the woods to eat acorns," and were so "tame," no doubt through want, that the In-

dians killed abundance of them in the woods, " by knocking them on the head with sticks*.

IN collecting materials for this part of our subject, it would also be useful to inquire, what changes have taken place in the times of the leafing, the flowering, and the fruiting, &c., of particular vegetables, as well *native* as *foreign*? There are still living among us, many old people, who could inform us, whether the Apple, the Pear, the Peach, the imported Cherry, and others, formerly flowered at the same time that they do at present. It is known that the Lima-Bean now flowers much earlier than it did when it was first introduced among us, between forty and fifty years ago. The *Franklinia* (*Gordonia pubescens*) has, in like manner, altered its time of flowering: but I do not assert that what has taken place, in regard to these two vegetables, is a proof that our climate of Pennsylvania has undergone any change. Indeed, I am fully aware, that whatever facts we yet possess relative to an alteration in the times of the frondescence, florescence, &c., of our vegetables, must be very cautiously admitted, if they be admitted at all, as facts of any importance in the view, which I have suggested, of the changes, or stability, of the American climates.

SOME important light might also be thrown upon the ancient or former state of our climate, by a careful examination of the annual circles of some of our largest trees. By such an examination, we should, at least, be able, on many occasions, to determine (what it is a point

* See Note T.

of curiosity and importance to determine), whether the uncommonly severe winters of Europe and Asia have also been the same in North-America*.

ONE of the greatest desiderata in the history of the meteorology of our country, is a comparative view of the climates of the two great regions of the United-States, that between the Atlantic and the Alleghany-mountains, and that between this great chain and the Mississippi, and from thence to the first great ranges of mountains westward. How far has the eastern wind advanced westward since the first settlement of the States of Ohio, Kentucky, and Tennessee? What is the right theory of the fact, that the southern trees and shrubs are very generally found considerably farther north in the western than in the eastern tract? What is the explanation of the fact, that of the species of trees which are common to the two districts, just mentioned, those which grow in the western do not attain to as great an age, and begin to rot, or decay, the soonest?

WHATEVER relates to the Diseases of our country is more or less intimately connected with the history of our climate. But I forbear to add any thing particular on this subject, as the inquiries connected with it more intimately belong to the College of Physicians, the Medical Society, and other institutions, expressly established for the promotion of medical knowledge. You will not, however, I hope, lose sight of this most interesting inquiry, to which the philosophical physicians of all countries and ages have paid attention, but to which the

* See Note U.

physicians of our country, until within the last fifteen or eighteen years, have been unpardonably inattentive.

SUCH, Gentlemen, are some of the numerous subjects to which I would wish to see the members of this Society turning their attention. The field, you will readily perceive, is an ample one. It will afford a rich harvest to many, both of the present and of future ages. For the bounds of natural history will, for ever, be enlarging.—It is much to be wished, and I flatter myself, that our wish will be gratified, that every member of the Society will consider himself pledged to add something to the stock of our knowledge of the natural history of the country. Some of you may find leisure to furnish us with regular essays, or memoirs. These, or extracts from them, I shall hope to see published, at some future period, in the TRANSACTIONS of the Society. Others of you, to whom the cultivation of *mere* natural history may be less interesting, or who may not possess sufficient leisure for the purpose, may contribute individual FACTS, or experiments, which, if they be collected or made with care, may form a most important part of our objects. These facts might be digested and arranged into regular order, and published in the Society's transactions, or copied, by the secretaries, into a book kept for the purpose, and allowed to be used by every member, in any way he may think proper.

As there is no science which is more disgraced by what are called facts than natural history; and as it should be the object of every real philosopher, to diminish, to the utmost of his power, the quantity of error,

and to prevent the accumulation and extension of idle tales, so it is to be wished that every member, or person, who may transmit to us notices concerning our animals, our vegetables, and minerals, or any of the other objects of the institution, would always be careful to distinguish between what is certain or well ascertained, and what is probable or conjectural. I say nothing of the necessity of a solemn and religious adherence to truth. I say nothing of that playfulness with science (if I may so express myself), which disgraced the character of one of the Presidents* of the Royal Society of London; and has disgraced the character of other cultivators of natural history. But I must not omit to say a few words on the subject of credulity.

CREDULITY is one of the most injurious features in the character of the naturalist, as well as of the historian. Its influence, in one individual, is often felt and propagated through many ages. Unfortunately, too, it has been the vice of naturalists, or those who have touched on questions relative to natural history, in all ages. It was his credulity, more than any thing else, which soiled the immortal work of Pliny on *Natural History*: a work, though often erroneous, and deformed by anile stories, above all praise: a work upon which, if we possessed no other materials for the purpose, one might construct a successful defence of the knowledge of the Romans in the time of Vespasian.—How much do we feel for Tacitus, the manly and the energetic

* Martin Folkes, Esq.—See Mr. Pennant's *Outlines of the Globe*. vol. i. p. 237.

Tacitus, when he seriously tells us, in his *Annals*, that “in the Consulship of Paulus Fabius, and Lucius Vitellius, after a long vicissitude of ages, the PHOENIX arrived in Egypt”; when he goes on to collect together the most extravagant stories relative to the life and the habits of this miraculous bird: some of which, indeed, his judgment leads him to reject; observing, “that in the account of the Phoenix there is no doubt a mixture of fable”; “but that this bird (says the great historian), from time to time, appeared in Egypt, seems to be a point sufficiently ascertained*”. It is to be regretted, that on other subjects, relative to natural history, the Roman Historian has exhibited some marks of his credulity; I will not willingly say, of his ignorance†. Indeed, few are the writers of civil history who have not sullied their works, when they have had occasion to treat of, or touch upon, points of natural history. With great pleasure, however, do I mention, as an exception to this position, the vast work of Mr. Gibbon on *the Decline and Fall of the Roman Empire*: a work from which even the student of natural history may collect many facts and much information; and this, too, so correctly and so cautiously related, that I do not recollect a single instance in which the fidelity of Gibbon, as a *naturalist*, can be called in question. How unlike his friend Dr. Robertson, who, with stronger and with better lights to guide him, has deformed his *History of America* with the most palpable falsehoods and errors, concerning the physical condition of this continent, and of its inhabi-

* See Note X.

† See the Germania of Tacitus.

tants*!.——We blush for Sir Walter Raleigh, whose learning, and talents, and taste, enabled him to write a stupendous and elegant work on the history of the world, when we read his account of whole nations of American Indians, who were entirely destitute of ^{heart} ~~necks~~†.——What shall we think of the learned Spanish historiographer, Herrera, who tells us, that “the Trochilus, or Humming-bird, feeds like a bee on flowers, and the dew that lies on them, and when the rains cease, and the dry season comes on, clings to the trees by its beak, and dies: but again returns to life, the following year, upon the return of the rainy season‡”. These (some of them, at least) are fit subjects for the rich genius and the warm imagination of a poet at his ease, amid the spicy groves or the flowery meades of Iran, or of Hindustan. Others of them, again, might, without the aid of much imagination, be employed as new subjects in the work of some future Ovid. All of them must be rejected by the NATURALIST: he will even reject them with a species of disdain; and, indeed, it is not without some difficulty, that we can prevail upon ourselves to attach an high authority, in *any* thing, to men who were capable of believing, and of publishing, such fables as I have mentioned.

THERE is, however, some apology for credulity in matters of natural history. The works and ways of GOD are, indeed, wonderful, and many things apparently fabulous, are strictly true. Perhaps, there is no

* See Note Y.

† See Note Z.

‡ See Note A*.

fable in natural history which has not arisen, very naturally I was going to say, out of some obvious and well authenticated fact. The beautiful fable of the Phoenix may have taken its rise from the history of the periodical returns of a Comet, and the theory of the learned of Egypt, or some other region, concerning the nature of these bodies.—The fable of Herrera is supported by the fact, that the Trochilus, like many other birds, is susceptible of, and actually does sometimes pass into, the torpid state: a state, in many animals, extremely similar to that of complete death: for who, but the most keen-eyed physiologist, can mark, in many instances at least, the line between life merely *interrupted*, and life *finished*, or at an *end*?

WITH such difficulties in the investigations of natural history, surrounded by truths which pass, by the slightest and most imperceptible shades, into fables, it should be the constant aim of the naturalist to describe and paint nature as she is. The addition of one solitary tint, whether added by the suggestion of fancy or urged by credulity, may render the picture unworthy of attention. “HISTORIA NATURALIS (I use the words of a very respectable naturalist, who is treating of the history of an animal, concerning which the most extravagant fables had been related), “*Historia Naturalis non bene digesta abit in Fabulam; praejudicia vero et nimia Credulitas Veritatem, etsi cominus satis cognitam, longissime aliquando propellunt**.”

* Jacobus Theodorus Klein. See his curious account of the *Mus Alpinus*, or Marmot, in the *Philosophical Transactions*. Numb. 486, p. 180, &c., for the year 1748.

YOU will observe, Gentlemen, that I speak of the printing of our *Transactions*. I do not suppose, that this is a step which can be taken *immediately*. But if the Society continue to be conducted in the manner I hope to see it conducted; if it be supported by the talents and the zeal of the members who now compose it; I cannot entertain a doubt, that in less than three years from the present period, we may be in possession of materials for an original, and interesting volume; a volume which shall reflect honour upon the Society, extend the empire of natural history, and teach our countrymen the real utility and importance of a science to which they have just, as it were, begun to pay any attention: a science which may be said to date its origin, in Pennsylvania, if not in the United-States, from the year one thousand, seven hundred and eighty-nine.

I do not despair of seeing the Society in possession of a room of its own. I hope to see its members in possession of a good and even extensive LIBRARY. The latter may be formed without much difficulty, and at a very moderate expence, whenever the Society shall show, by its transactions or proceedings, that it is all worthy of the name which it bears. I think that some of your attention should be directed towards the formation of a MUSEUM, or collection of natural objects, particularly such as belong to the American continent. I neither wish nor expect to see the Society engaged very extensively in this business, as there is already established among us, a MUSEUM of great value; and which does honour to its founder, and

even to the United-States: a museum to which every American citizen should endeavour to contribute his mite of support. There are, however, two classes of objects which we ought to labour to collect; I mean specimens of our indigenous *Plants*; and specimens of our *Minerals*. Indeed, I will flatter myself, that every member of the Society will feel it a kind of duty incumbent upon him, to furnish us with such rare and curious vegetables or minerals as he may be able to collect, in different parts of the country. In this way alone, a great accession may, in the course of a very few years, be made to the stock of our knowledge of the BOTANY and MINERALOGY of the United-States.



You have agreed, Gentlemen, to denominate your association the PHILADELPHIA LINNEAN SOCIETY. In making choice of this name, in preference to every other, you have gratefully rendered homage to one of the most illustrious cultivators of science the world has, hitherto, produced. Certainly no other man, neither in ancient nor in modern times, has contributed so much to extend our acquaintance with the *external* characters of the living works of nature, on this globe, as has LINNÆUS. Endowed, by a benificent Creator, with an uncommon portion of genius; warmed by an imagination of the richest kind; which, however, his correct judgment generally restrained within proper limits; blessed with the most persevering and virtuous industry, which

enabled him to accomplish whatever schemes of usefulness or glory his sanguine mind may have devised; which enabled him to triumph over poverty, and over the active malevolence of his enemies; thrice happy in an ardent and well-directed ambition, without which the energies of mind are oftentimes of little avail; the Naturalist of Sweden has assumed one of the highest stations in the throne of intellectual glory. I am far from being a blind idolater at the shrine of LINNÆUS. I am not ignorant of the imperfections of his systems, or of the errors into which he has often fallen. But these errors, when we consider the vast compass of sciences—medicine and all the branches of natural history,—which the bold and fertile genius of Linnæus embraced;—these errors, I say, must be acknowledged to be few in number.—And in regard to his Systems, should they *all* (as some of them, unquestionably, will) crumble into dust, or share the fate of other systems, neglect,—the world, a thousand years hence, will continue to regard, with veneration and with wonder, those powerful and successful efforts, which called Natural History from an embryo and misshapen state into form, into regularity, and beauty, and even placed it in one of the most elevated stations among the sciences which have attracted the notice of mankind, during the whole of the eighteenth, and the first years of the nineteenth, century.

LET us follow, then, with zeal, with industry and care, as far as our talents, and the more pressing pursuits and duties of our life, will permit us to follow;

let us follow, I say, the footsteps of the great modern architect of natural history. With him as our guide; with only a portion of his talents and his warm zeal;—in these regions of America, where God has displayed to his children of Liberty and Comforts, the immeasurable variety and usefulness of his works, for their study, and contemplation, and happiness; in this peaceful empire, extending widely westward from the shores of the Atlantic to the vast regions that are washed by the Mississippi, the Missouri, and their streams; and southward from the confines of Superior, and Ontario, to the borders of the countries of the people of Florida and Anahuac;—how vast, how new, how felicitous, is the field for observation!! O let us not supinely pass our time, without calling into view the treasures of this world! And excuse my selfishness, if I urge you to make haste, that I, before my course is run, may know, through your labours, at least a part of what is to be learned of the natural history of these regions: that I may know, that my fire is not too weak to animate some of you to these glorious pursuits of intelligence.

I CALL upon you, again, to labour for the support, the respectability, and the importance, of our infant institution. Some of you are soon to fix yourselves in the most opposite regions of North-America: while others of you are called by your profession, or urged by your intrepid zeal, into the distant countries of China, of Java, or of Hindustan. Remember, wherever you may be, the Philadelphia Linnean Society. Remember this seat of your intellectual happiness. In answer

to those who may whisper to you, that the study of natural history is incompatible with the regular pursuit of your profession, tell them, and tell them again, that in all countries, some of the greatest naturalists have been physicians; and not merely physicians, but some of the most eminent clinical practitioners. Need I mention the names of Withering and Darwin? as proofs of this assertion.

As to myself, Gentlemen, I have to assure you, that in all my studies, I shall have a constant eye to this institution, and to the promotion of its various useful objects. The indispensable calls of my profession; the necessity I, at length, find myself under, of devoting a larger portion of my time to the arrangement of those materials, relative to the natural history and the ancient state of our country, in the collection of which I have been engaged for near seventeen years, may, for a time, prevent me from devoting much of my attention to the current business of the institution. But viewing, as I do, the foundation of this Society with much satisfaction; and believing that its complete establishment will be an event of the highest interest and consequence in the literary history of our country, I cannot but feel proud of associating myself with you: of attaching myself more firmly to those studies in the pursuit of which I have passed the happiest hours of my life; and of connecting myself, by still more endearing ties, to those of you, whom I have been so fortunate as to conduct to the first threshold of the study of Medicine, and of Nature.

PERMIT me to close this feeble and imperfect address, by assuring you, how sensible I am of the honour you have conferred upon me, by electing me to the place of the first PRESIDENT of the Society.

* * * * *

APPENDIX,

CONTAINING

NOTES & ILLUSTRATIONS.

NOTE A.—Page 17.

“I BELIEVE my reader will be of my opinion, that from one end of America to another, the red people are the same nation and draw their origin from a different source, than either Europeans, Chinese, Negroes, Moors, Indians, or any other different species of the human genus, of which I think there are many species, as well as among most other animals; and that they are not a variety occasioned by a commixture of any of the above species must also appear.”—“The above account will perhaps, raise a conjecture, that I believe the red men are not come from the westward out of the east of Asia; I do not believe it; I am firmly of opinion, that God created an original man and woman in this part of the Globe, of different species from any in the other parts, and if per chance in the Russian dominions, there are a people of similar make and manners, is it not more natural to think they were colonies from the numerous nations on the continent of America, than to imagine, that from the small comparative number of those Russian subjects, such a vast country should have been so numerously peopled, and by what we know from the geographical discoveries that have been made within this century, it was undoubtedly easier for these

people to have crossed out of America into Asia, than it was for the white people we find in Labrador to come from Lapland; yet who will deny that a Laplander and Eskimaux are of the same original stock?" *A Concise Natural History of East and West-Florida, &c. &c.* By Captain Bernard Romans. Pages 38, 39. New-York: 1776.

NOTE B.—Page 17.

MR. JEFFERSON, the writer to whom I allude, says, "imperfect as is our knowledge of the tongues spoken in America, it suffices to discover the following remarkable fact. Arranging them under the radical ones to which they may be palpably traced, and doing the same by those of the red men of Asia, there will be found probably twenty in America, for one in Asia, of those radical languages, so called because, if they were ever the same, they have lost all resemblance to one another. A separation into dialects may be the work of a few ages only, but for two dialects to recede from one another till they have lost all vestiges of their common origin, must require an immense course of time; perhaps not less than many people give to the age of the earth. A greater number of those radical changes of language having taken place among the red men of America, proves them of greater antiquity than those of Asia." *Notes on the State of Virginia; written in the year 1781, somewhat corrected and enlarged in the winter of 1782, &c.* The original edition. Pages 181, 182.

IN my *New Views*, Preliminary Discourse, pages 72, 89, &c.*, I have controverted, I hope with some success, the opinion of Mr. Jefferson concerning the great number of radical languages in North-America. I reserve a more ample and finished view of the arguments in support of my own opinions, for a new edition of my work, and for other inquiries in which I have long been engaged. Meanwhile, although I do not here contend, that there are not several radical Indian languages, within the limits of North-America, I assert, without the fear of contradiction, that

* See, also, the Vocabularies; and the Appendix, pages 18, 19, &c. &c.

the languages which have lost *all* affinity to each other are hardly to be met with in America; and that the ingenious author of the *Notes on the State of Virginia*, when he published that work, had no good reason for supposing, or asserting, that there were many such radical languages in this continent. The language of the Iroquois, or Six-nations, is unquestionably the same as that of the Cheerake, the Creeks, the Chikkasah, the Osages, and the Sioux. And the result of an extensive and cautious inquiry will be, that the dialects of the Delaware-stock are not *radically* different from those of the Hurons, and Six-nations, however different they may, at first sight, seem from each other.

NOTE C.—Page 22.

AMONG various other species of birds, the Mexicans, as we are told by Clavigero and other writers, domesticated “turkeys, quails, geese, ducks, and other kinds of fowl*.” The Quail here alluded to was not, indeed, any of those species which are to be met with in Pennsylvania, and other middle and northern parts of the United-States; but, in all probability, the species called *Tetrao Mexicanus*. I cannot learn that any species of *Tetrao* was domesticated by the tribes to the north of Mexico. Some of these tribes domesticated the Turkey, and perhaps various other birds, whose names and properties may have escaped our attention.

NOTE D.—Page 26.

THE rattle-snake is, without doubt, an animal possessed of a considerable share of intelligence. He, certainly, distinguishes his keeper, or feeder, in confinement from other persons, and when he has been so far domesticated as to cease menacing the former, he will manifest every disposition to attack and injure the latter; particularly if they be entire strangers. This horrid reptile might, I am persuaded, be domesticated, and rendered, in a great measure, harmless; *and that without the experiment of drawing his poisonous*

* The History of Mexico, &c. vol. 1. page 380. English translation. London: 1787.

fangs. A very large rattle-snake, after I had had it in my possession for some months, showed not any disposition to injure any person who approached its cage; and when it had actually, on one occasion, nearly made its escape from the cage, it suffered me to replace it with a pair of tongs, without showing the least disposition to injure me, or indeed without exhibiting any marks of irritation. I have assisted, by *near* approach, a rattle-snake in the process of drawing off its skin, which had, before, been tedious and difficult to it. It approached the instrument of assistance, which I laid upon the floor, and soon convinced me, that it well knew for what purpose I had placed the instrument there.—In the *Supplement to a Memoir**, &c., the reader will find some facts in proof of the memory, or reminiscence, of the rattle-snake.

NOTE E.—Page 29.

SOME persons, with whom I have conversed on the subject, have assured me, that the salmon has never been seen or caught in any part of the Niagara-river: but this, I believe, is not a correct statement.—Fish, of various kinds, are much affected by accidental changes or impregnation of the water in which they reside. After the sinking of the Solway-Moss, in 1772, the salmons left the Esk, for some weeks, owing no doubt to the river having been “rendered black as ink by the mixture of the moss†.” It has been observed, that fish of various kinds have become less numerous in the Meherrin-river, in Virginia, since that river (owing, it is supposed, to the clearings which have been made upon its banks) has become more muddy. On the contrary, however, Catfish (*Siluri*), which delight in muddy water, have increased in number in the Meherrin. These facts are well calculated to show, that fish are very sensible of the changes, from foreign impregnations, which occasionally take place in rivers, and other waters: and such impregnations are, doubtless, *one* of the causes of the well-known fact, that fishes are often observed to leave the waters which they have been accustomed to frequent for ages.—But reverting to the Salmon of Ontario, I

* Page 31.

† Philosophical Transactions. vol. 62, for the year 1772. Page 123.

think it most probable, that it is the noise of the cataract of Niagara which deters them from passing up the river as far as that bound, beyond which they could not pass. This subject, however, is worthy of farther inquiry.

NOTE F.—Page 31.

THE heat of the river Trout of Britain has been stated to be 64 degrees of Farenheit's thermometer. Mr. Jonathan Williams did not find the heat of several Cod-fish and Halibot, which he examined, to be greater than 39 degrees, when the thermometer in the air was at 57, and the water on the surface at 52. In other experiments, "the thermometer was put into three Codfish and one Halibot successively, the instant they were hauled up, and the instrument marked 37, in every case. The air was at 57, and the water at the surface was 53." Mr. Williams concludes, from his experiments, "that in all the instances the animal heat of the fish was about 16 degrees colder than the water at the surface*." These experiments appear to have been made with care: but they should be repeated, under a great variety of circumstances, before it would be prudent to assume it as a point completely established, that the heat of the Cod (*Gadus Morhua*) and the Halibot (*Pleuronectes Hippoglossus*) is precisely what our author has stated it to be.

NOTE G.—Page 35.

I HAVE presented to the American Philosophical Society, an extensive memoir concerning a considerable number of the pernicious insects of the United-States. This memoir, which will be published in the Society's *Transactions*, involves both the natural history (properly so called) of the insects, and the means of preventing and of curing the evils which they inflict.

NOTE H.—Page 37.

FOR some interesting notices concerning the *Tettigonia Septendecim*, I beg leave to refer the reader to the *Philadelphia Medical and*

* See Transactions of the American Philosophical Society. vol. 3. pages 98, 99.

Physical Journal. vol. 1. part i. articles xv. and xvi; and to the *Second Supplement* to the same work, articles xi & xiii. It is my intention to digest all the numerous materials, which I already possess, concerning this singular animal, into an extensive memoir (illustrated with plates), for the completion of which I hereby invite the communication of facts and remarks. I cannot promise "a well-written history" of this insect: but I hope to be able to communicate much new information, concerning its structure, functions, and manners; the result of many years attention to the subject.

NOTE I.—Page 41.

THE western parts of North-America, beyond the Mississippi, are daily presenting us with some of their animal productions. Among these we have already recognised so many of the quadrupeds of the northern and eastern parts of Asia, that there is every reason to believe that we shall soon find our *Fauna* very rich in many of those animals, which have, hitherto, been supposed to be excluded, as *indigenous*, from America. It is now ascertained, that the *Taye* of certain nations of California is the *Ovis Ammon* of Linnæus; the *Angali* of the Asiatics, which first makes its appearance in Asia, as we travel east towards America, in the neighbourhood of the great river Jenisseia. In western America, we have, also, recently discovered the *Arctomys Citillus**, the *Sorex minutissimus*†, one of the smallest of quadrupeds; not to mention several others, which Asia has long been known to possess. These discoveries are highly interesting to the Zoologist; and they cannot fail to appear valuable to the Geologist, as they serve to give additional strength to that most probable opinion, that America and Asia were once united to each other‡.

NOTE K.—Page 45.

THREE distinct species of *Zizania* are described by Mr. Michaux§. Two of these species, *Zizania miliacea* and *Z. clavulosa* of

* Earless Marmot.

† Pigmy Shrew of Pennant.

‡ See page 43.

§ *Flora Boreali-Americana.* tom. i. p. 74, 75.

this author, are very common in many parts of North-America. *Zizania clavulosa* is the *Z. aquatica* of Linnæus, who, however, has confounded this species with the plant described and figured by Sir Hans Sloane, 1. p. 110, t. 167. It is, also, the plant of which Mr. Aylmer Bourke Lambert has lately favoured us with an excellent figure. This writer has shown, that the *Zizania aquatica* of the *Species Plantarum*, p. 1408, and the *Zizania palustris* of the *Mantissa*, 2. p. 295, are one and the same plant*. The *Zizania miliacea* of Michaux is, however, a very distinct species, and both of the species are eaten by the Indians of the countries adjacent to the lakes, and by various species of water-fowls, which are observed to fatten upon them very speedily. In the neighbourhood of Philadelphia, and in other parts of the United-States, the seed of *Zizania clavulosa* (I prefer the name imposed by Michaux, for they are both aquatic plants) are the favourite food of the Reed-Bird (*Emberiza Oryzivora*), and of different species of Rallus, or Rail†. I am not yet prepared to say any thing positive concerning the comparative nutritious quality of the two plants, both of which have an extensive range in North-America. *Zizania clavulosa* is known to grow and ripen its seed as far north in America, as the latitude of 50°: a most encouraging fact for the inhabitants of many of the northern parts of Europe, who might reap the benefit of this plant's seed as high as the latitude of sixty degrees.

NOTE L.—Page 48.

THE Indians about Philadelphia have long been acquainted with the esculent quality of the bulb of *Sagittaria*; and from them, no doubt, the Whites learned to eat it. Many of the latter still retain some of the Indian names of this vegetable. The bulb of *Sagittaria* is said to be a very important article of traffic among the Indian nations in the western parts of North-America, especially upon Columbia-river. Whether any of the Americans cultivate this plant, as the Chinese

* The Transactions of the Linnean Society of London. Vol. vii. pages 264, 265.

† See Fragments of the Natural History of Pennsylvania. Part First. Tables.

are known to do, I have not learned. The rude tribes upon the Delaware and its waters, did not cultivate it. They found it in sufficient quantity, prepared by the hands of nature.

NOTE M.—Page 49.

I AM not certain whether the Buffaloe-clover is a species distinct from the White Clover, or *Trifolium repens*. On the Ohio, where I have seen it, this plant grows to a great size, on which account, and because it constitutes so large a share of the food of the Buffaloe (*Bos Americanus*) it has received its name of Buffaloe-clover,

NOTE N.—Page 51.

THIS is but a small list of the known native die vegetables of the United-States. It might be important to collect, into one view, what is already known of the properties of these plants. Much valuable information on the subject might be collected from the inhabitants, especially perhaps the women, of our country, who are in the habit of employing many of our plants as dies. But from the Indians, if I do not mistake, much more information is to be obtained. The latter were not unacquainted with the use and value of mordants, long before they had any intercourse with the Whites. Besides alum and other mineral mordants, they employed the acid berries of some species of Sumach (*Rhus glabrum*, &c.), and the astringent juice of vegetables, especially that of the fruit of the Crab-apple (*Pyrus coronaria*). Is it not probable, that, in some instances, such vegetable mordants are to be preferred to those of the mineral kind?

NOTE O.—Page 53.

THIS wall, which for a long time had been deemed artificial, and which was accordingly adduced as a proof of the existence of a state of society and of population in North-America, much more improved and extensive than that of the Indian inhabitants whom the Europeans found in the countries north of Mexico, is in the county of Rowan, at the distance of about fourteen miles from the city of Salis-

bury. As early as the year 1796, I had an opportunity of examining some specimens of the stone of this supposed building of the ancient Indians, and immediately perceived, that they were naturally figured basaltes; and that the whiter covering of the stones, which had been very confidently considered as the calcareous cement, or mortar, was nothing more than the stone itself in a decomposed state. I believe this opinion is at present very generally admitted, though there are not wanting some persons who still contend, that the wall is artificial, even admitting, that the stones may have been shaped by nature in the forms in which we find them.

NOTE P.—Page 54.

SOME of the most curious American petrefactions, or impressions, that I have seen, are those of the beaks of Cuttlefish (*Sepiae*), very similar to those of which Professor Blumenbach has given an account, in his *Archaeologia telluris*, &c*. The American specimens were not found in the great valley of Berkeley (where, however, it is probable they do exist), but in a more narrow calcareous valley, running parallel with this, and separated from it by the North-Mountain, in Virginia. —It is my intention to publish an account, with representations, of these and other American petrefactions, &c., either in the View of my *Travels* through different parts of the United-States, or in some other shape.

NOTE Q.—Page 57.

I HAVE made some mention of this porcelain in the *Philadelphia Medical and Physical Journal*†, and have transmitted specimens of it to Mr. Vauquelin, at Paris. There are immense quantities of a similar earth in the country of the Cheerake-Indians: and specimens, of an inferior quality, have been brought from the country west of the Mississippi. These latter, as well as the former, were supposed

* Specimen *Archaeologiae telluris terrarumque inprimis Hannoveranarum*, &c. in *Commentationes Societatis Regiae Scientiarum Gottingensis*. vol. xv. class. Phys. p. 150. tab. 11. fig. 5.

† Vol. i. Part First, page 163.

to be Chalk. It will be very interesting to pursue the veins of porcelana through our continent, as this pursuit will point out to us the old granite and gneise strata of the continent.

NOTE R.—Page 58.

PROFESSOR Gronovius is my principal authority for the assertion, that Tin was found in Pennsylvania. In his *Index Supellectilis Lapideæ*, published at Leyden in 1740, this learned writer mentions a “*Stannum polyhedron regulare purpurascens, Pensilvanicum.*” Gronovius corresponded with John Bartram, Colden, Clayton, and other ingenious men in North-America, from some of whom, probably from Bartram, he received the specimen which he describes. If I do not greatly mistake, there were specimens of Tin in the fine collection of North-American minerals, which was made by my Father, near forty years ago, at a time when he paid more attention to this part of natural history, than, so far as I know, any other person in the (then) Colonies. The greater part of my father’s collection was sent to England; but falling into the hands of those who knew little of its value, it has never been heard of, or mentioned in any of the printed accounts of minerals, that I have seen.—Tin was well known to the ancient Mexicans; and, if I mistake not, to the people of Florida. Gronovius, in the work already referred to, mentions three specimens of Zinc from Pennsylvania: “*Zincum sterile micaceum;*” “*Z. sterile micaceum squamis saxo cotaceo immixtis:*” “*Z. sterile micaceum squamis saxo rufescenti immixtis*.*”

NOTE S.—Page 60.

THE remains of at least two large elephants (of that species which has been denominated *Elephas Americanus*†) have been discovered in the neighbourhood of Newburgh. The bones were found beneath a vast quantity of marl, intermixed, in some places, with the re-

* *Index Supellectilis*, &c. p. 9, 10.

† See the First and Second Supplements to the Philadelphia Medical and Physical Journal. Articles vi & x.

mains, or impressions, of marine *testacea*, of various kinds. Bones of the same species of the genus *elephas* have been discovered in other parts of the country along the Hudson-river, as at the town of Troy, at Claverack, &c.—I am far from imagining, that all the elephantine bones, which are discovered in different parts of North-America, are proofs of the existence of a general or partial deluge. If dependence may be placed upon the accuracy of the facts which I communicated to Mr. Cuvier, of Paris*, it would seem highly probable, that many of the American elephants have perished independently on any such catastrophe as is here alluded to. Many others, it is possible, have been destroyed by the ancient inhabitants of America, to whom these animals may have been formidable, as are the elephants of the present day to the inhabitants of some parts of Asia and Africa.

NOTE T.—Page 63.

As Mr. Lawson's work is not very easily met with, I shall here quote, at large, the passage to which I have referred. After remarking that the Indians by means of their records, "which are a Parcel of Reeds, of different lengths, with several distinct marks, known to none but themselves; by which they seem to guess, very exactly, at accidents that happened many years ago; nay two or three ages or more;" he proceeds: "the reason I have to believe what they tell me, on this account, is, because I have been at the meetings of several *Indian Nations*; and they agreed in relating the same circumstances, as to Time, very exactly; as, for example, they say, there was so hard a winter in *Carolina*, 105 years ago, that the great Sound was frozen over, and the Wild Geese came into the woods to eat Acorns, and that they were so tame, (I suppose, through want) that they kill'd abundance in the woods, by knocking them on the head with sticks." *A New Voyage to Carolina, &c.* p. 181. London: 1709. It is to be regretted, that Lawson does not inform us of the *exact* year in which he heard this tradition related. But it is easy to arrive, within a very short period, at the time. Lawson came into North-Carolina in the beginning of the year 1701, and

* See Second Supplement, &c. Art. x. pages 172, 173.

he remained in the country eight years. Of course, the tradition relates to some winter either in the very last years of the reign of Elizabeth, or the first years of the reign of her weak successor.— Since this period, viz. in the year 1779—1780, the great Sound has been frozen over.

NOTE U.—Page 64.

LINNÆUS, by examining an Oak tree, was able to distinguish, with great certainty, the hard winters of 1578, 1687, and 1709. The circles formed in these years were narrower (thinner) than those of the other years. By an attention to some of the vast forest-trees, especially in the western parts of the United-States, our knowledge in regard to the state of our climate, might be carried much farther back. Oaks and other trees, not less than four hundred years old, are, or were a very few years since, growing upon the old earthen fortifications near the junction of the rivers Ohio and Muskingum*.

NOTE X.—Page 67.

“PAULLO FABIO, L. Vitellio Coss. Post longum sæculorum ambitum, avis Phœnix in Ægyptum venit; præbuitque materiem doctissimis indigenarum, & Græcorum, multa super eo miraculo disserendi.” &c. &c. *C. Cornelii Taciti Annalium* lib. vi. The curious reader, who wishes to amuse himself with what has been said of the Phoenix by other writers, may consult the writings of Herodotus (in *Euterpe*), Martial (lib. 5), Pliny (lib. x. cap. 2), Solinus (cap. 46), Ovid (*Metamorph.* 15), Philostratus (*de vita Apollonii*, lib. 3), P. Mela (lib. 3. s. 9), Mariana, the Spanish historian (lib. 4. cap. 1.), and an hundred others. It has been observed, by one of the translators of the works of Tacitus, that “the accounts given by the ancients of this wonderful bird, if collected together, would swell into a volume.” A well-written, and not too voluminous, dissertation, or memoir, on the subject is, so far as I know, a work which is still desiderated.

* See Elements of Botany. Part ii. pages 18, 19.

NOTE Y.—Page 68.

I HOPE I shall be able to show, in my *Strictures* on Dr. Robertson's *History of America*, that what I have here said of that work is neither unjust nor too severe.

NOTE Z.—Page 68.

SIR Walter Raleigh's account of headless men, with eyes in their breasts, is contained in the history of his voyage in search of El Dorado. In justice to Raleigh, it must be mentioned, that he does not pretend to have seen these extraordinary men: but says he gave credit to the account of their existence on the authority of persons who said they had seen such men. On such ground, we are not permitted to tax the veracity of the great but unfortunate Englishman. And who would wish to find in such a man as Raleigh, the "*blandae mendacia linguae*." I wish he had said nothing about the Armadillo: or, at least that he had omitted the story of the "white horn growing in his hinder parts, as big as a great hunting horn, which they use to wind instead of a trumpet." It is certain that the Armadillo has no such apparatus as this.—It is a curious circumstance, but it is a fact, that the most substantial charges that have been brought against the veracity (I will not say the morality) of Sir Walter Raleigh, are founded on the marvellous stories which I have mentioned. This ought to be a lesson to great men not to be too pliant in their belief, or rather their credulity; and not to sport with the public, in their accounts of the productions of nature, however seemingly inconsiderable they may be. I know not how to explain the story of the Armadillo. I will not consent to believe, that the relator told a wilful falsehood.

NOTE A*.—Page 68.

I HAVE not now an opportunity of consulting the original work of Herrera. It is possible that Stevens's translation, the only one I had at hand, may have led me to think rather unfavourably of the Spanish writer, in this respect. Perhaps, Herrera does not say, that the Trochilus dies, but merely that it passes into a very profound sleep. It is certain, that others of the Spanish writers allude to the tor-

pidity, and not the death, of the little bird. De Laet has collected the sentiments of one or more of these writers, in the following words. “ Inter volatilia merito laudatur, avicula longe minima, instar papilionis oblongo rostro & incredibili plumarum subtilitate atque elegantia: (è quibus componuntur singulari industria imagines, haud secus quam si coloribus essent pictæ) rore tantum, qui floribus insidet, instar apum victitans.”—“ *Huitzitzil* appellari, scribit Fr. Ximenez, & floribus marcescentibus, arborum truncis rostrum infigere, atque ita immobilem instar mortuæ illis adhærescere per sex menses, donec pluviis redeuntibus Flora rursus campos vestiat*.” As it is a fact, that the *Trochilus* is susceptible of the torpid state, and has even been found torpid in Pennsylvania, Maryland, &c., it is worthy of the attention of naturalists to institute a set of experiments to ascertain the laws of this torpidity. And such experiments might be made without much difficulty. I have no doubt, that the greater number of the Humming-birds, which are seen about Philadelphia, and in other northern parts of the United-States, migrate to us from the southward; from Mexico, the West-India islands, &c. But it is highly probable, that a *few* of these birds have slept away the winter among us; and are not completely roused from their death-like slumbers, until the season of inflorescence returns.

* *Novus Orbis seu Descriptionis Indiæ Occidentalis Libri xviii.* Authore Joanne de Laet, Antwerp. lib. v. cap. xvii. p. 256. Lugd. Batav. 1633.

THE END.

